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Light and

Lighting

February 1960



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Edward Wright's essay on New York in pages 14-27.



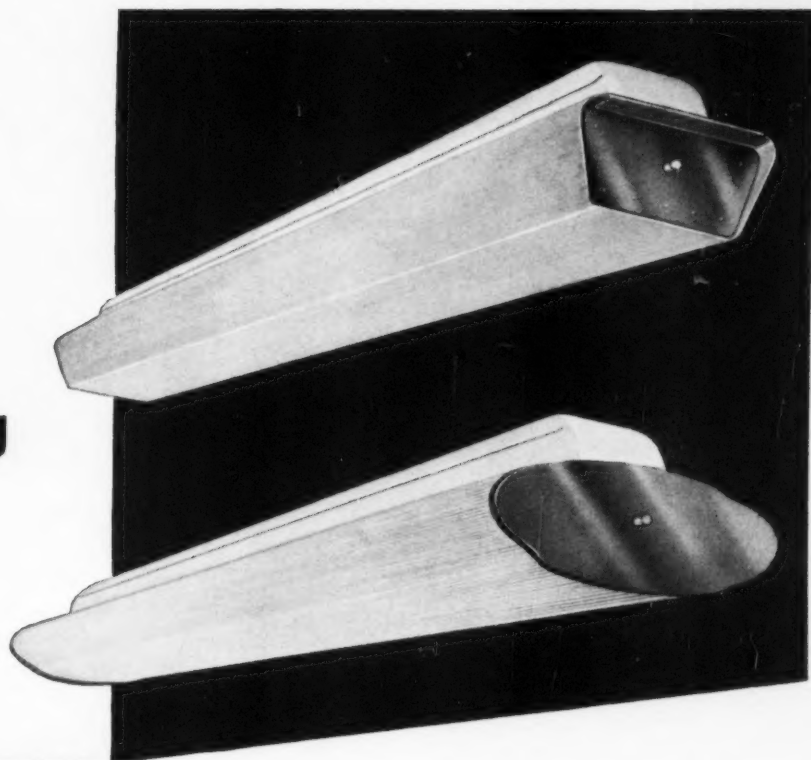
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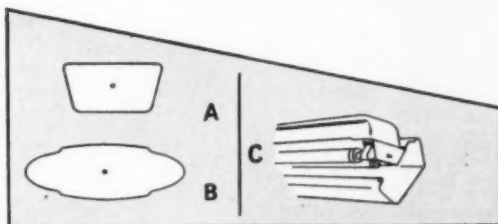
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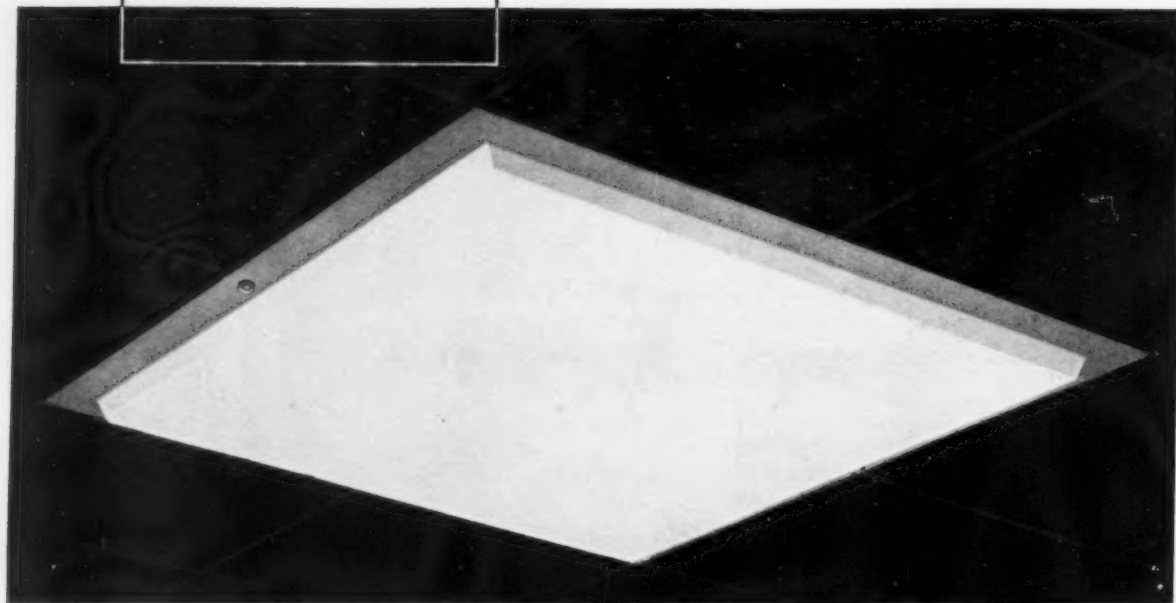


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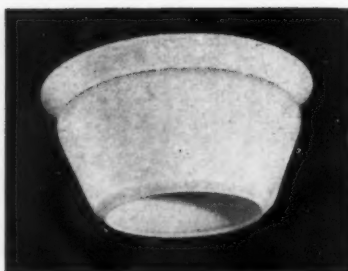
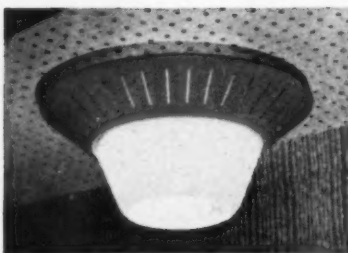


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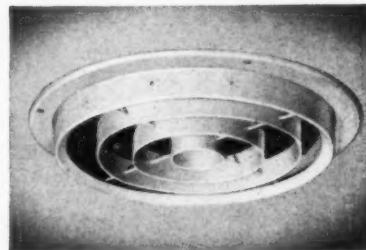
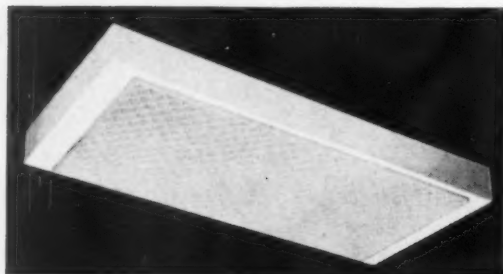
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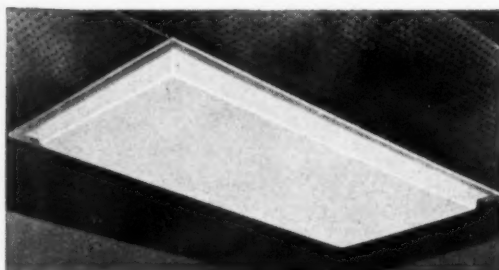
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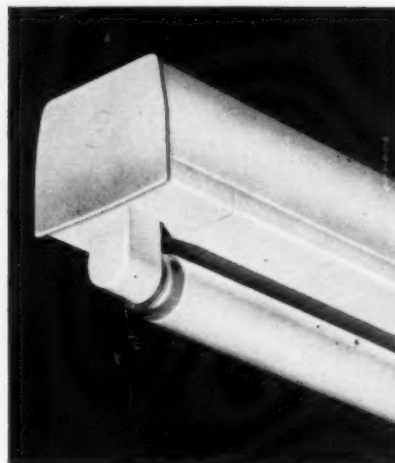
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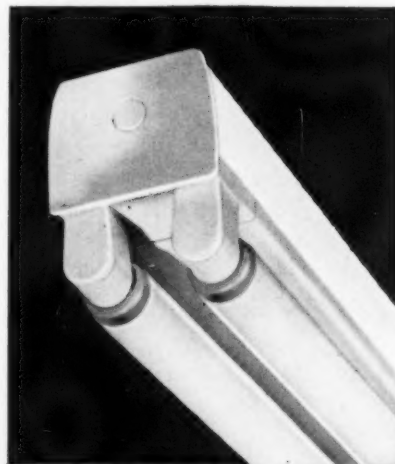
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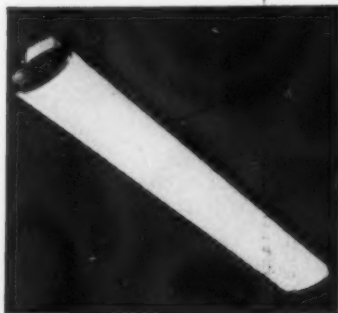
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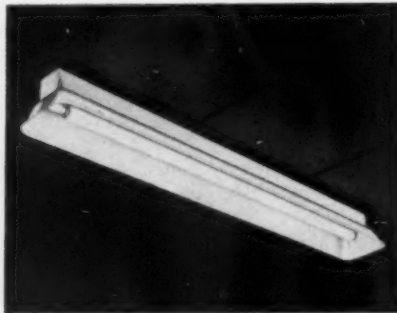
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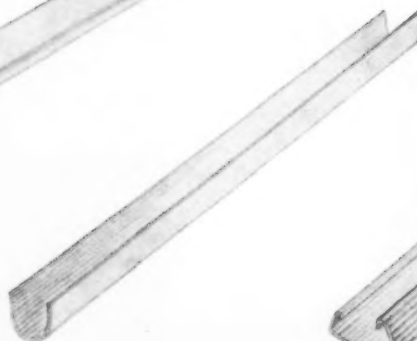
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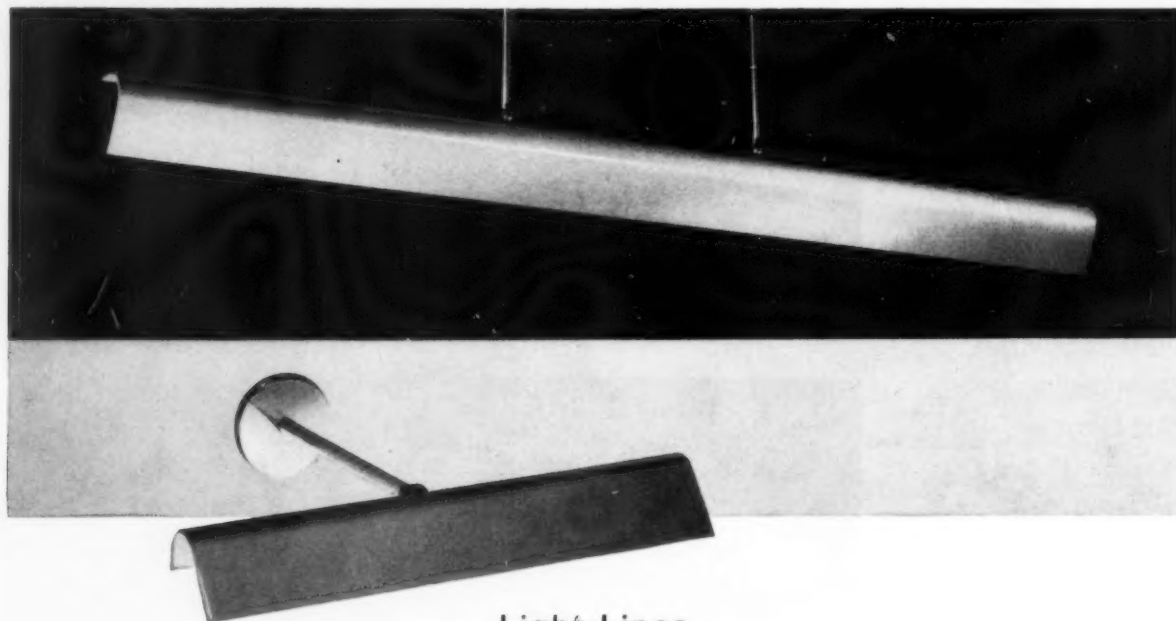
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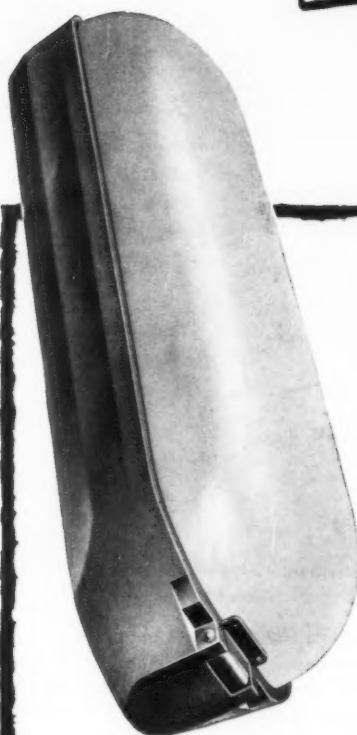
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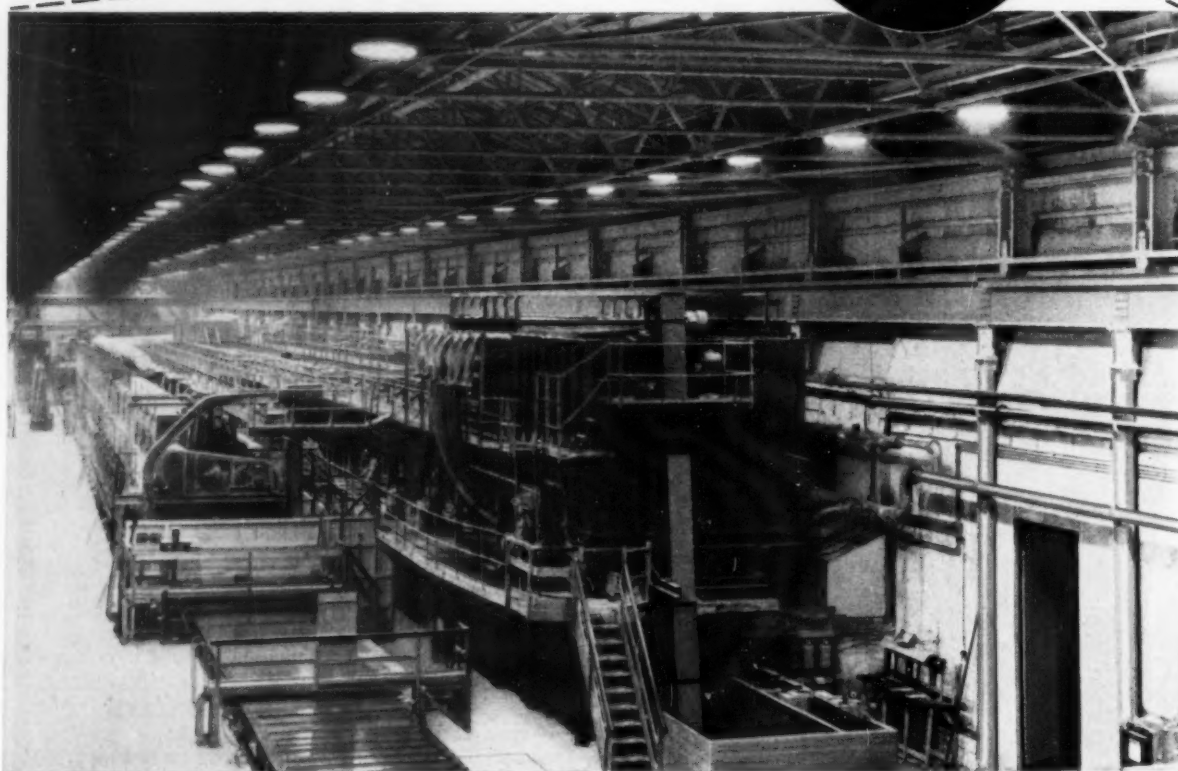
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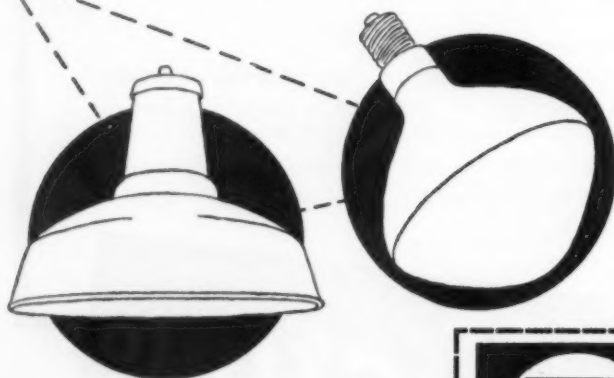
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Lighting and the Elderly

THE upward trend in levels of illumination which are recommended and actually used is, to some extent, taking care of the needs of the elderly without the greater light-need of these people being used as an overt pretext for higher illuminations. The levels of illumination recommended for various purposes in the current British IES Code take into account the average visual capacity at about the mid-point in the average span of life. However, this average span of life is increasing and so its mid-point is tending to a more advanced age—one at which it is correspondingly more important to avoid a shortfall of illumination. It is astonishing with what little illumination the very young can manage if need be, and it is not sufficiently realised how much more illumination elderly people need. The handicaps that beset many people in the autumn of life are all too often aggravated by inadequate lighting in their homes. But although, as we have said, lighting recommendations are tending in the right direction to assist the elderly, they will not avail unless they are put into practice widely. Unfortunately, many elderly people do not have control of the lighting they have to live with. They need good lighting especially for movement about the house; many of the domestic accidents they sustain are falls that might be prevented if there is sufficient light on steps and stairs and in other hazardous localities. It is surely paradoxical that the most hazardous areas in homes are often the worst lighted. Where there are elderly residents it is not only paradoxical but sometimes fatal.

Notes and News

WE WENT along to the lecture on ship lighting given by Mr. Grundy and Mr. Vaughan to the IES last month fully expecting to be instructed though having no idea that the instruction would be put over in such an entertaining way. The indoctrination into matters nautical began before the lecture, tea being taken amidst strange pieces of equipment and to the sound of seagulls that might have been about to take the cake out of one's hand. The President as he made his entry into the lecture theatre dead on 1800 hours was piped aboard by a fearsome looking bosun and his mate. The lecture itself was put over equally entertainingly though the two authors opened our eyes to what is involved in lighting a ship from stem to stern. The title of the lecture was perhaps a little misleading to some who had expected to hear only about the decorative lighting of passenger vessels. The authors did devote a small section to this aspect and showed a few slides which drew comment in the discussion from Derek Phillips who wanted to know why the interiors of passenger ships should be made to look like anything but what they are, why they have to look like hotels. Mr. Grundy seemed to sympathise and said that finding himself recently in the officers' quarters on a newly commissioned ship he had imagined himself to be in the Design Centre so familiar were the furnishings and so un-sailor-like.

Roads, Light and Traffic Safety

ON NOVEMBER 4th and 5th last, 620 lighting engineers, and others interested in street lighting from one point of view or another, attended a conference with the above title held at Bad Homburg. On the first morning the papers and discussion were concerned chiefly with the aims of street lighting. The first paper was by Professor W. Linden, of Essen, who said that 20 to 28 per cent of street accidents occurred after dark and stressed the importance of being able to see clearly the boundaries of the roadway, islands and other features. Dr. H. Lossagk then spoke on night-time accidents and their causes, especially the low level of illumination compared with that during the day. He referred to the Road Research Laboratory's statistical work on the reduction of accidents by good street lighting. Next Dr. F. Bitzl dealt with the statistical approach to the problem, while other speakers advocated the issue of codes, discussed the use of sodium lighting for guiding through traffic and considered the economics of accident prevention.

In the second session Dr. E. von der Trappen gave a comprehensive survey of codes and compared the provisions of the various national documents. Mr. Ivar Folcker then spoke of

Swedish practice and Mr. de Boer gave a general paper on the performance of street lighting installations. These papers were discussed by a number of speakers, several of them officials concerned with public lighting in German municipalities.

On the second morning Professor O. Sill gave a paper on the relation between street lighting and street architecture and spoke of the large expenditure, running into millions of marks annually, for the installation and maintenance of street lighting in a town such as Hamburg. Bridges and tunnels were not neglected and three papers were read on different aspects of this specialised field of public lighting. Economics provided the theme of two papers read and discussed at the fourth session and it was towards the end of this meeting that Dr. von der Trappen mentioned the lighting of a motorway from posts 130 feet in height. He was careful to point out that this installation was still in the experimental stage.

Conference on Industrial Lighting

THE BIRMINGHAM Centre of the IES has issued details of a one-day conference on industrial lighting which is to take place on April 21st. The conference is intended for works' managers, works' engineers and production engineers and a full and interesting programme has been arranged for them. The conference will be opened at 10 a.m. by Mr. A. B. E. Lovett, HM Superintending Inspector of Factories in the Birmingham area. Then will follow talks on the technical basis of good lighting (Dr. W. E. Harper), light sources and equipment (Mr. H. R. Ruff) and maintenance and economics (W. Robinson). Immediately after lunch the film "New light on industry" will be shown followed by a description of some recent installations and particular lighting problems by Mr. J. G. Holmes. The conference will close with a forum and final remarks by the IES president.

The conference will take place at the College of Technology, Gosta Green, Birmingham. A fee of £2 per delegate will be charged and morning coffee, lunch and tea will be provided. Further details of the conference and enrolment forms can be obtained from Mr. W. J. P. Watson, 91, Brandwood Road, King's Heath, Birmingham 14.

Nom de l' A.F.E.

THE ATTEMPT to change the name of the IES is so recent that few readers will need to be reminded of the result. However it is possible that the attempt prompted the sister society in France to have a look at its own title—this time with some result. The title was, you will no doubt recall, the Association Française des

Eclairagistes—in basic English, the French Society of Lighting Engineers. We are pleased to note that the title has now been amended to the Association Française de l'Eclairage—or the French Lighting Society. This is a much better title and brings the AFE (the initials remain unaltered you will notice) into line with the IES which has never considered itself a society only of lighting engineers. (Incidentally one of the alternative titles suggested for the IES was the British Lighting Society, but we understand that the IES Council didn't like British and the rest of the Society didn't like the remainder.)

Another item of news from the AFE is that they will be celebrating their 30th birthday this year and will accordingly be holding their annual conference (*Journées de la lumière*) in Paris from May 30th to June 2nd. Quite a few people will no doubt welcome the opportunity of taking part in the “*fetes du Trentanaire*” and further information can be obtained in due course from the Secretary of the AFE, M. Armand Vallat, 33, Rue de Naples, Paris 8.

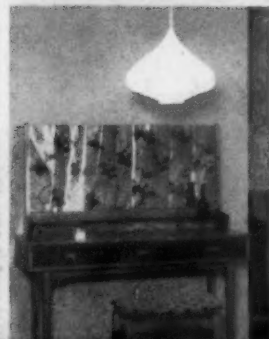
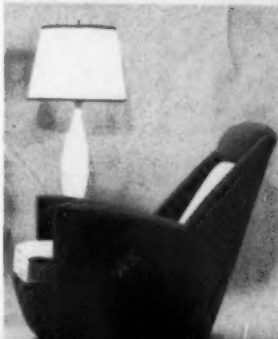
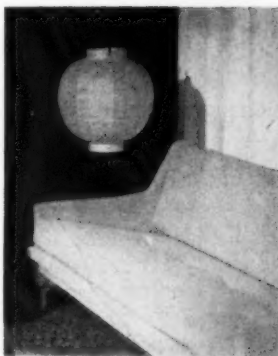
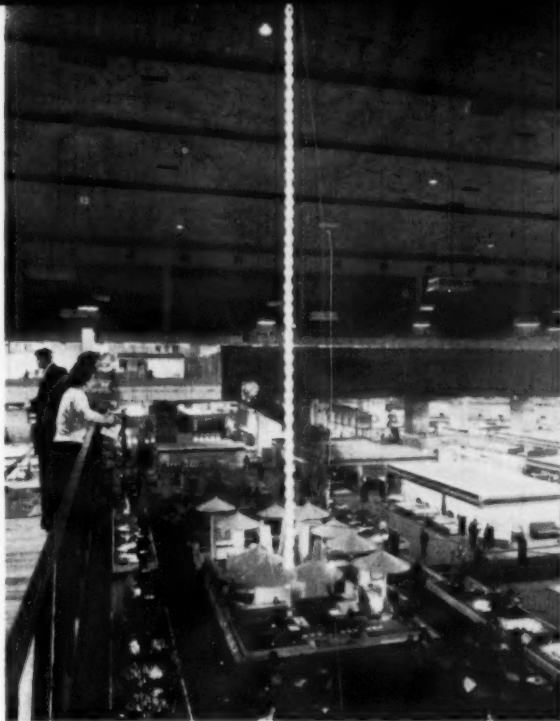
Going back to the name of the AFE—we wouldn't mind betting that the French had a much easier job getting the new title approved than would be possible in this country. The decision was probably taken around the table and the old title struck out and the new inserted just like that.

Lighting and furniture

FOR SEVERAL years Misha Black (centre picture), co-ordinating designer for the Furniture Exhibition, has used a lighting device as the central feature of this Earls Court show. This year he conceived the idea of a “finger of light” rising 120ft. from floor to roof. Designed by John Reid, it comprised a 16in. diameter sculptured tube of opal acetate enclosing a continuous line of 8ft. fluorescent lamps. The feature was made by Rotaflex, whose fittings Mr. Black has used on previous occasions.

During the past few years, the Furniture Exhibition has, incidentally, changed beyond recognition. Originally a trade show at which no self-respecting designer would have wished to have been seen (alive or dead), it is today one of the most rewarding annual exhibitions open to the public. Not only are the exhibits of a very high standard—British manufacturers of medium-priced furniture have little to fear from foreign competition—but the display techniques themselves are of considerable interest. Most firms show their products in realistic room settings, complete with carefully chosen household accessories and impedimenta.

Into whichever category lighting fittings fall, these, too, are selected with taste. Four examples are illustrated—from the stands of (top) A. F. Buckingham Ltd. and J. Berry & Sons Ltd., and (bottom) Guy Rogers Ltd. and Herbert E. Gibbs Ltd.





Left, the street elevation with its deeply recessed entrance gives little hint of the vast arena-like interior of the museum. An un-neighbourly building dominating aggressively the not unattractive 19th century terraces in its vicinity, was this Frank Lloyd Wright's way of deliberately cocking a snook at American conformism?

The Guggenheim Museum

Frank Lloyd Wright's legacy to New York

THE Solomon R. Guggenheim Museum was designed by Frank Lloyd Wright to house the collection of paintings and sculpture of a millionaire patron of modern art. Both chronologically and artistically it represents the culmination of the career of one of the twentieth century's most controversial architects. Frank Lloyd Wright's individualism bordered on megalomania and there are many who will condemn the Guggenheim Museum as being more than anything else a monument to its architect's ego.

It is necessary, however, to consider the building, in the light of Frank Lloyd Wright's attitudes both to architecture and the sister art of painting. At a time when most architects pay at least lip service to functionalism, Frank Lloyd Wright was above all a formalist. And it is no coincidence that, in the course of its critical article on the Guggenheim Museum, *Architectural Forum* mentions the names of Phidias, Brunelleschi, Michaelangelo and Wren.

Frank Lloyd Wright worshipped at the shrine of architecture for more than sixty years and in all his work it is clear that he saw nothing wrong in imposing on a building "programme" a preconceived idea of architectural form. The spiral form on which the design of the Guggenheim Museum is based (a lift takes you to the top) is one which Wright had been developing for many years. Indeed, it might be said that the spiral was an obsession with him. In 1925 he designed a project for the Gordon Strong Planetarium which would have involved turning the top of the Sugar Loaf Mountain into a great spiral road that would have led to the planetarium. In the late '40s, when the Guggenheim Museum was already under consideration, he designed a spiral ramp for his interior of the Morris Store in San Francisco and a spiral-form self-service garage in Pittsburgh.

For the latter, the spiral was an extremely practical solution to the design problem. Whether in the design of the Guggenheim Museum it serves any functional purpose is another matter. (Standing on a slope is certainly no aid to looking at the pictures, though it may be less tiring to walk continually down a ramp than to walk through a normal art gallery.) One may, however, doubt whether Frank Lloyd Wright was much concerned with the functional requirements. It is said that he was not over fond of painting, or, as John Canaday put it in the *New York Times*, he believed that "its only legitimate function was that of an adjunct to architecture". Says Canaday (and other critics have agreed with him): "If [Wright] had deliberately designed an interior to annihilate paintings as an expressive art . . . he could not have done much better". Or, as Russell Lynes put it in *Harper's Magazine*, "In creating the Guggenheim Museum [Wright] may not have struck the death blow to painting, but he has got it sagging on the ropes".

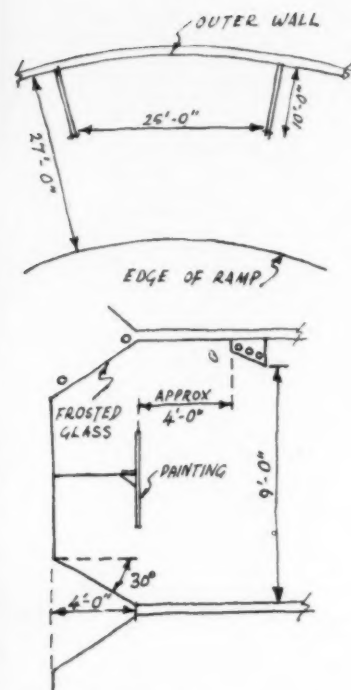
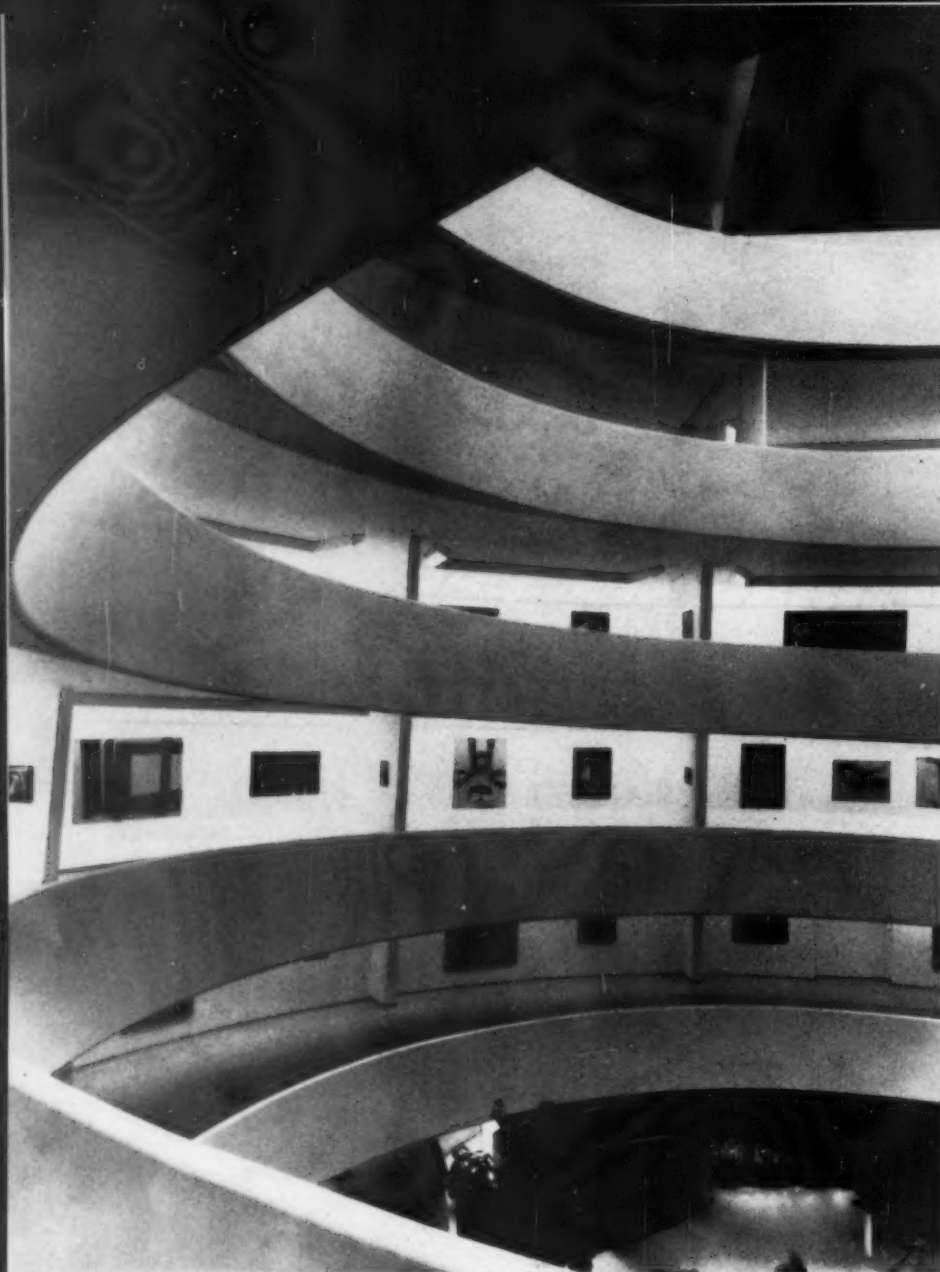
Wright, himself, in talking of his aims, speaks of the building in terms of an end rather than a means. "In a great upward sweep of movement," he claimed, "the picture [would be] seen framed as a feature of architecture". . . . The whole interior would be an open, luminous, floating, uninterrupted space. . . .

As the photographs show, these aims have been achieved and, as an example of the architectural handling of space and form, the building will justify the claims of those who hero-worship Frank Lloyd Wright, though not perhaps the claim of his wife that the museum "will become the Mecca of mankind".

It was Frank Lloyd Wright's intention that the paintings should be hung on the outward sloping walls—as on an artist's easel (though why this should be an advantage I can-

Right, the vast dome, 90 ft. above the terrazzo floor of the great central hall, reminiscent of the dome of the Johnson Wax building. Daylight from it was intended to bathe the paintings with natural light; in fact, Frank Lloyd Wright's supplementary artificial lighting has had, itself, to be supplemented by extra fittings designed by the museum director, James Johnson Sweeney. (Note the curiously out-moded pattern of the glazing bars.) Below, typical view of an upper gallery showing how the paintings 'float' in the blaze of back lighting reflected from the white-painted outer walls of the ramp. The surface of the paintings is lit to 150-200 lm/ft² by fluorescent lamps (two cool white to one warm white) in trapezium section troughs fixed direct to the ceiling, about 4 ft. in front of the paintings.

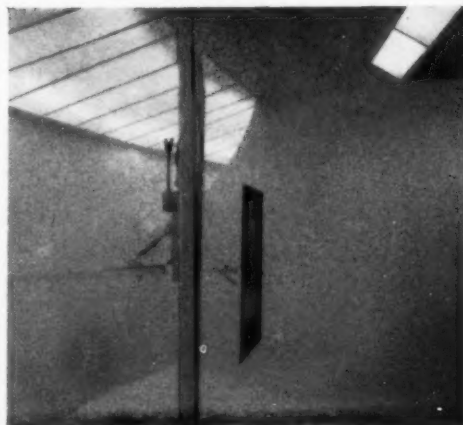


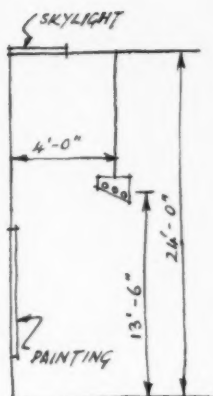


Top, part plan of gallery showing positions of display screens arranged at right angles to the outer wall. Above, typical section through spiral ramp showing (i) method of 'floating' paintings, which are not framed, about 4 ft. from surface of outer wall; (ii) position of built-in back lighting (as arranged by Frank Lloyd Wright) and (iii) supplementary lighting trough added by the museum director. Below, close-up photograph illustrating lighting scheme —note how the laylight of frosted glass insufficiently diffuses light from the two rows of fluorescent lamps. Left, typical view (from second floor gallery) across the main hall.

not imagine), and that they should be lit mainly by daylight from the vast dome above. In fact this daylight has proved insufficient, particularly as it has to counteract the light from two lines of fluorescent lamps concealed by a laylight of frosted glass in the angle between the outer wall and the ceiling.

This artificial lighting shines directly into the eyes of the visitor so that, had Frank Lloyd Wright's scheme been completed as designed, it would have been difficult to see the pictures. Having myself studied some of the paintings in the Guggenheim collection, I can see some advantage in this arrangement, but it is hardly surprising that the museum's director has made important modifications to the scheme. Firstly, he has painted the background walls white, instead of cream; secondly, he has "floated" the paintings in space about 4ft. from the peripheral wall, each picture being held in position by a single horizontal arm cantilevered from the





Above, in the ground floor grand hall, which is 24 ft. high, backlighting is from semi-circular recesses, while the museum director's supplementary lighting is from troughs suspended 13 ft. 6 in. above floor level. The tops of these troughs are part open to give a proportion of upward light.

outer wall; and, thirdly, he has counteracted the strong backlighting by even stronger front lighting from ceiling-mounted troughs. These troughs—U-shaped on plan to light pictures on the outer wall and on screens at right angles to it—house three rows of fluorescent lamps (in the lumen proportion of three cool white to one warm white) with ballasts remote for noise reduction. The troughs are fitted with acrylic plastic diffusers; give 8,800 lumens per 4ft. run and provide an illumination level of between 150 and 200 lm/ft² on the surface of the paintings.

On the ground floor, pictures are hung conventionally on the walls. There is top lighting from semi-circular recesses in the ceiling, supplemented by troughs as described above, but suspended 10ft. 6in. below the 24ft. ceiling. These troughs are trapezium shaped in section with the base of prismatic acrylic plastic at an angle of 14 deg. to the horizontal.

The Guggenheim Museum is Frank Lloyd Wright's only building on Manhattan Island. Its windowless exterior strongly reflects the spiral form of the interior, but its form and scale is so much in contrast to the other buildings in the vicinity that one wonders whether F.L.W. was having a sardonic revenge on the society that had constantly spurned him for his non-conformism. Was the un-neighbourly exterior a deliberate affront? Did the master, in fact, have his tongue in his cheek? Frank Lloyd Wright will never give us the answers to these questions—he died last year—but he is on record as having said about the museum: "They'll still try and figure this one out 100 years from now!"

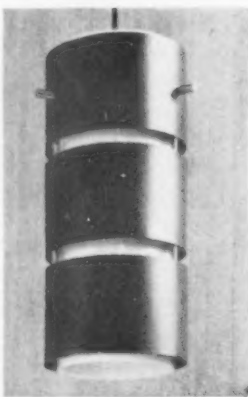
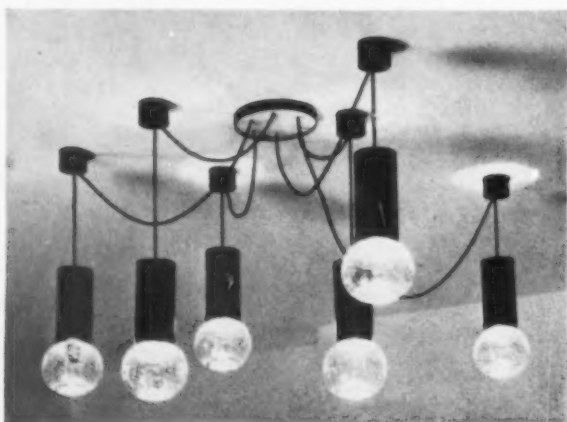
MICHAEL JENNINGS.

Right, this elegant auditorium, one of the few on Manhattan Island, is perhaps the most successful part of the museum. Both walls and ceiling are bathed in light from concealed sources and, apart from spotlights for the stage, there is only a single ring of visible fittings—downlights around the periphery of the sunken seating area.





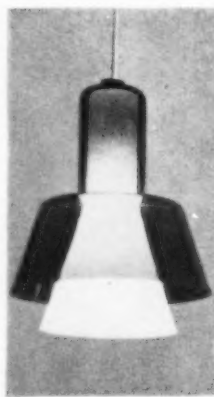
Left and below, multi-light pendant fittings from Atlas Lighting's 'Chelsea' range. This comprises hand-wrought glass bowls in seven shapes and six colours, designed for suspension immediately below matt-black metal cylinders housing 60-watt silvered reflector lamps. Suspension units as seen on the left are available for three to five fittings, while the arrangement illustrated below can be purchased for four to six units. In addition there is a matching wall bracket for a single unit. A well-produced catalogue is available from the makers.



Left, pendant fitting for 100-watt lamp imported by Scandia. The three outer cylinders are black metal; the inner diffuser, white plastics. Right, and extreme right, Scandinavian fittings imported by Danasco of Golden Square. The former has an inner diffuser of white opal glass and an outer shade of coloured translucent glass. The latter is constructed entirely from spun aluminium and, in addition to its decorative effect, gives strong downward light.



Above, four fittings made by X-Lon Products of Gillingham Street, S.W.1, under licence for Stockmanns of Helsinki and Lykton of Sweden. Made of 'Perspex', all four fittings have been awarded gold medals at Milan Triennales. The two fittings on the left have inner shades of white opal and outer covers of clear grey. Like the third fitting, they were designed by Yki Nummi. Right, pendant fitting for 75-watt lamp imported by Scandia of Marylebone High Street. The outer reflector is black; the inner one, white; the depth of the fitting, 12½ in.



Lighting as Decoration

The trend toward a separation of functional and decorative lighting has led designers to produce new fittings whose role as an element of the interior décor is as important as the part they play in giving useful light. Illustrated above are four fittings from Scandinavia, four designed in Scandinavia but made in the U.K., and two from a new British range.



Shadow forms and reflected images

By Ernst Rebske [Munich]

"Chiaroscuro, clair obscur, is the name we give to the appearance of solid objects when only the effects of high lights and shadows are considered." (Goethe, "Zur Farbenlehre. Didaktische Teil.")

AN interesting example of an optical illusion is shown above. At first sight the impression produced is unmistakably that of a watercourse in a desolate and mountainous landscape. An estimate of the true scale seems to be difficult. In fact the watercourse is a tiny trickle, a rivulet such as we see on the shore as the tide is going out.

Now we turn the page upside down and the watercourse changes to a

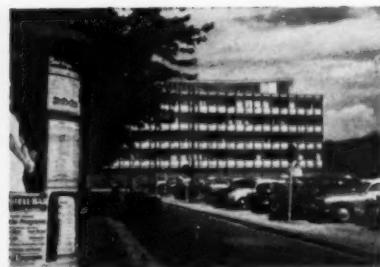
range of mountains flattened at the top. (This flattening will prevent most observers from taking the picture for a representation of a wave on the sea.) The change can be repeated as often as we like. At a certain point, as the picture is turned round, the appearance changes. I have observed that this holds equally for all observers and I therefore regard the picture as an excellent example of the combination of physiological and psychological elements in an illusion.

At the same time it brings out the importance of the pattern of highlights and shadows. These are responsible, so to speak, for causing the change—in

this case, from intaglio to high relief. We can always notice this change in pictures of a similar type when the position of the light source is unknown and is taken to be at a place other than at which it is really situated.

To the lighting engineer such matters have a more than momentary interest. Indeed they have much in common with certain lighting problems. In workshops, for example, by means of a particular arrangement of shadows or the production of reflections, fine details may frequently be revealed more clearly.

There is a book, "We see only Shadows", by Dr. Arthur Kiesel, in



Left, Fig.1, this window of an upholsterer's shop in Munich (facing north) reflects the office building opposite. Above, Fig.2, an actual photograph of the office building (taken from the same viewpoint as Fig.1) shows little more detail than the reflected image.

which an attempt is made to give a philosophical explanation of the visual perception of objects around us. Thus, for example, the author looks at himself in a mirror and writes as follows:

"Over there, where I see a man in the mirror, there is, in reality, no man. The mirror hangs on the wall which separates me from the adjoining room

and I know for a certainty that at the position where I perceive the man apparently behind the plane of the mirror there is only air and nothing but air. . . . I am not asleep, nor do I dream; the man whom I see in the mirror facing me is no phantom, no product of my imagination. Indeed when dreaming, as I know full well,

there are no real men where I apparently perceive some. . . .

"He stands clearly before me in tangible form and yet he is not there. The more I ponder on this the more extraordinary does it seem to me and as, late at night before retiring, with a candlestick in my hand, I glance once again in the mirror, it seems to me as if I were looking through a window, a magical window, into an utterly different, strange and unreal world, into a ghostly world-beyond, and the man behind the glass now starts to become uncanny as, illuminated by the candle he bears aloft, he gazes inquiringly at me out of the dark with his thoughtful, speculative eyes".

So far Dr. Kiesel. . . .

A lighting engineer is not required to plunge into such philosophical questions, for he regards working with light as a practical task and treats it in most cases as a tool for providing good working conditions. Similarly he regards reflections as phenomena which are produced by light and the reflecting action of suitable materials under certain conditions.

Unwanted reflections, such as those from writing paper in offices or from the glass in shop windows, are troublesome. Under unfavourable conditions, for example, the glass of a window behaves like a mirror and ceases to be transparent.

One of the principles involved can be explained simply as follows: Of the light falling on a pane of glass, the



Fig.3, reflections in the window of a carpet shop provided with a sunblind. The photograph was taken from a distance of 10 ft.; it shows that in the upper part shaded by the blind reflections are prevented and the carpets displayed can be clearly seen.

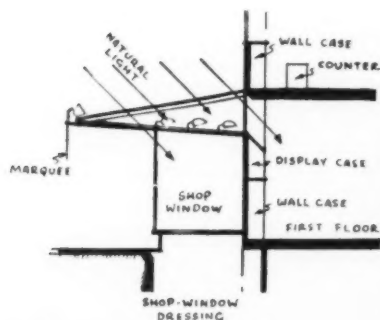
greater part will be transmitted, a little will be absorbed and perhaps 2 to 6 per cent reflected. This reflected light produces on the surface an upright and faint mirror image of the surroundings. The darker the background of the shop window (due to its depth and to the colours and reflection factors of the goods displayed), the stronger this reflected image appears. Under the most unfavourable circumstances (Fig.1) the goods displayed cease to be visible. Thus, with shop windows facing north, the windows themselves are permanently "in the shade" while the reflected surroundings are more strongly illuminated.

Fig.3 shows a window in which carpets are displayed. Here, on account of the nature of the goods shown, the window is deep and the dark goods absorb a great deal of light. From a certain distance the articles displayed are no longer to be seen, though, as can be

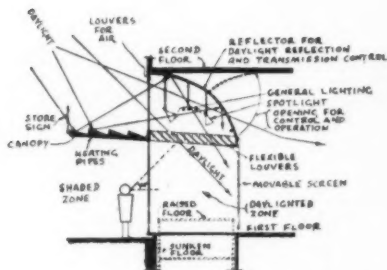
seen in the photograph, which was taken from a distance of some 10ft., a projecting sunblind screens the upper part of the window and prevents any reflection there. Consequently we can see the pattern of the carpets in the upper part of the window.

Various methods have been devised to prevent these unwanted reflections. Several, including the use of curved glass, are described in "Planning Stores

that Pay"—a book by Dr. Parnes, published by the "Architectural Record" (see Figs.4-6), and in Fig.7 is illustrated the use of curved glass for the window of a carpet store in Zurich. To anyone looking at such a window for the first time the effect is striking. Because the reflections are nearly always very weak, the first impression is that the glass has been removed and that the window enclosure is entirely open to the street.

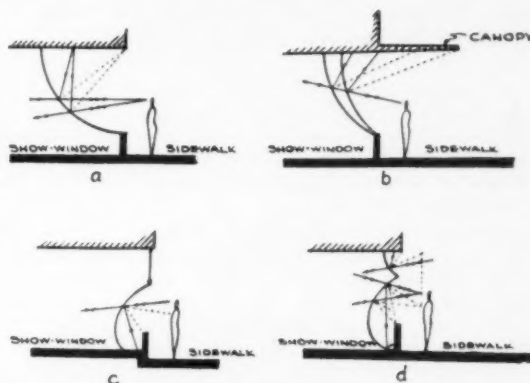


Above and below, Figs.5 and 6, constructional methods, such as extending the window forward from the building or the use of artificial lighting, that can reduce the disturbing effects of window reflections. (From 'Architectural Record', Feb. 1949).



Right, Fig.7, carpet shop in Zurich, with glass window curved as in Fig.4b and canopy. The glass is free from reflections and the carpets are clearly seen.

Right, Fig.4, four methods of avoiding reflections by using curved glass, as suggested by Dr. L. Parnes. (From 'Architectural Record', Feb. 1949)



The Distribution of Interreflected Light in Rectangular Rooms

J. M. WALDRAM,

B.Sc., F.I.E.S.

Explores the distribution of light reflected from the walls, ceiling and working plane on to the other surfaces of a rectangular room, showing how the contributions of the various surfaces change over the room, and the relevance of the mean illumination as found by Phillips' P_k factors.

A RECENT note⁽¹⁾ showed how the method of Designed Appearance Lighting could be applied to a rectangular room, and demonstrated a simple method for obtaining accurately the interreflection component for this case. In the simplest form of this method this component was obtained for the centre point of each of the principal surfaces.

Robinson in an accompanying note⁽²⁾ drew attention to the other methods of obtaining similar information, e.g., the Daylight Protractors⁽³⁾ perfected by the Building Research Station⁽⁴⁾ and to the luminance transfer functions devised by Phillips⁽⁵⁾ giving the average illumination on each principal surface received from the others. Inasmuch as the protractors and the illumination factors give the illumination at a point and the transfer functions give the mean illumination, it is of interest to compare the two.

Distribution of interreflected light

In the method described it was shown how by a slight elaboration it was easy to obtain the illumination factor for any point, not merely the centres of surfaces. Using this device the illumination factor has been found for various points on the walls and working plane for a square room having a height equal to half the side, for which the room index is 1 and the equivalent height k (Phillips) is 0.5. The points are shown in Fig.1. It is assumed that the luminance of each surface is uniform, i.e., that direct light is provided to compensate for any variations in interreflected light.

The distribution of the illumination factor is shown by contours in Figs.2 and 3 for the working plane and for a wall, on drawings indicating a quarter of the working plane and a half of the wall. For illumination on the working plane the illumination factor for the ceiling must be the complement of the factor for the walls; the contours giving the

wall factor are therefore identical with those for the ceiling but with complementary values. For illumination on the wall the factors for the working plane are identical with those for the ceiling but the diagram is inverted; the factor for the light from remaining walls is the complement of the sum of the factors for the ceiling and for the working plane.

Discussion of values

In the centre of the working plane the factor for the ceiling is greater than that for the walls; at a radius of $\frac{1}{4}$ of the side of the room they are equal, but at the

wall the factor for the walls is twice that for the ceiling. In the corner the factor for the walls is about 4 times that for the ceiling.

Thus within a circle of diameter $\frac{1}{4}$ of the side of the room, at the centre the factor for the walls is only $1\frac{1}{4}$ times that for the ceiling, and at the edge the factor for the ceiling is $1\frac{1}{4}$ times that for the walls; but near the edges and especially in the corners the disparity is considerably more. But a circle of $\frac{1}{4}$ the side of the square represents less than half the area of the room, so that the mean interreflection illumination of the work-

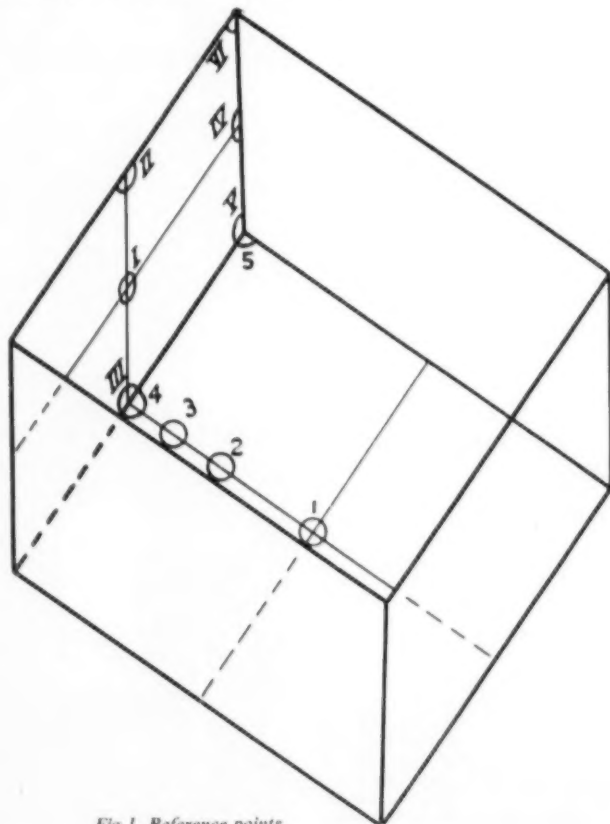


Fig.1. Reference points.

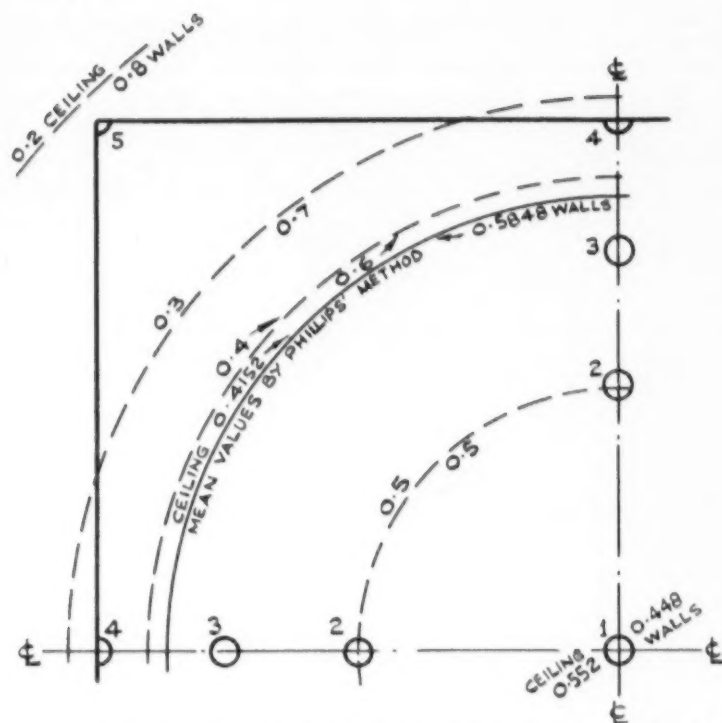


Fig. 2. Plan of one quarter of working plane showing illumination factors on working plane from walls.

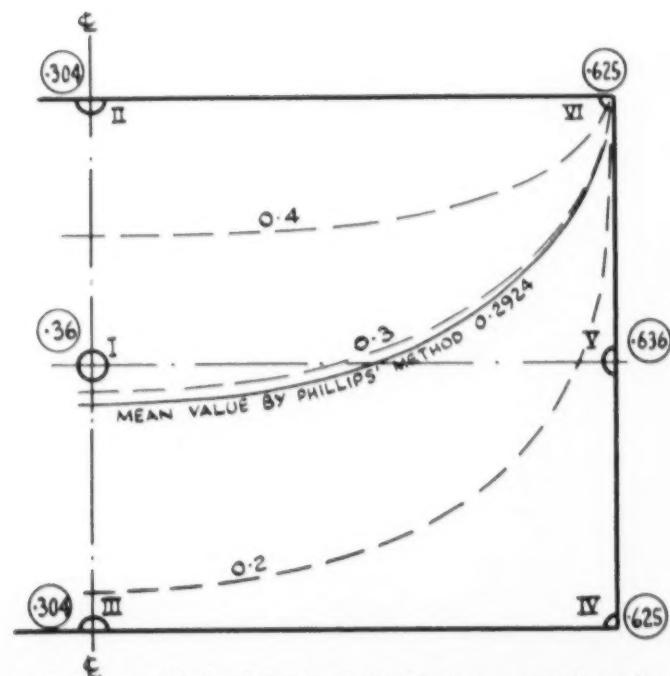


Fig. 3. Elevation of half wall showing illumination factor on wall from ceiling. Numerals in circles indicate factors for remaining walls.

ing plane from the ceiling or walls taken separately is determined quite largely by the values near its edge.

On the walls the ceiling naturally gives the greatest illumination at the top of the wall, where its contribution is $2\frac{1}{2}$ times that at the bottom; conversely the working plane has a corresponding maximum at the bottom. Both these effects diminish in the corners, where light from the remaining walls predominates. The light reaching a wall from the remaining walls varies little from top to bottom of the walls, but in the corners it is about twice that on the centreline.

Mean illumination factors (Phillips' method)

The mean illumination factors obtained by Phillips' method have been worked out and agree with the present calculation. In Figs. 2 and 3 the contour at which the factor is equal to the mean value as determined by Phillips' P_k factor has been marked. On the working plane it is seen to lie near the edges of the room, for the reasons discussed above. On the walls it lies about half way up the walls but runs up to the corner as might be expected.

Interpretation

In interpreting these values it must be recalled that what has been plotted is in each case a part only of the light received by interreflection, which is usually a part only of the total illumination. The balance as between walls and ceiling, in the light received by the working plane from other surfaces, varies from centre to edges; but the variation in total interreflected light will depend upon the relative luminances of the walls and ceiling. In the example given in the previous communication the mean luminance of the walls was 6.25 ft.-L, allowing for blinds, and that of the ceiling was 4.5 ft.-L. Using these values in the present room, in the centre of the working plane the contribution of the ceiling would be 3.85 and that of the walls 2.8, a total of 6.65 lm/ft². At the centre of one side the figures are respectively 2.35, 4.16 and (total) 6.51 lm/ft²—a negligible difference, especially when there is superimposed upon it a direct illumination of some 40 lm/ft².

Much the same argument applies to the ceiling, except that in schemes using direct light (to the working plane) there is no swamping effect of light reaching the ceiling direct from the fittings. On the walls there may be more effect, since the luminance of the ceiling and of the working plane may be more markedly different; but any difference is likely to be swamped by direct light, which it will be more difficult to provide evenly, so that variations in direct light may

well mask variations in interreflected light.

Similarly if the average illumination is obtained from P_k values the total interreflected light will again be the sum of that from the walls and the ceiling, and unless their luminances are very different the result will vary little from that determined from values in the centres of the surfaces; in the example quoted the contribution on the working plane from the ceiling would be 2.9 and from the walls 3.65, a total of 6.55 lm/ft² which is closely the same as the values previously obtained.

Application to colour effects

The swing of the relative effects of

wall and ceiling in providing interreflected light has however a bearing upon colour effects in interiors where the walls or the working plane are coloured. In regions where the direct light is small and surfaces are lighted mainly by interreflection there can result subtle and sometimes intriguing changes of colour. Thus in corners, if there is no direct light, the effect of the walls is greatest. In the upper corner of two walls and the ceiling there is a maximum interreflection effect, which explains why when there is little direct light and all these surfaces are white, the upper corner tends to vanish—an effect not sought by the architect—and all three surfaces exhibit the hue of the

walls or floor. In interiors having wall benches the amount of light received on these benches from the adjacent wall is appreciably greater than it is near the middle of the room, and if the wall is coloured the effect may be appreciable, quite apart from the effect of the wall upon the colour and brightness adaptation of the user.

References

- (1) Waldram, J. M.: *Trans. Illum. Eng. Soc.* (London), **23**, 113 (1958).
- (2) Robinson, W.: *ibid.*, p. 124.
- (3) Waldram, P. J.: *The Builder*, Aug. 2nd, 1940.
- (4) Dufton, A. F.: *Journal of Sci. Inst.* **17**, 226, (1940); D.S.I.R. Tech. Paper No. 28, H.M.S.O. (1946).
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I.E.S. ACTIVITIES

At the meeting in London on January 12, Mr. J. T. Grundy presented a paper entitled 'Ship Lighting—Perils and Prospects for the Lighting Engineer.' The paper was illustrated with demonstrations given by the author's colleague, Mr. C. H. Vaughan.

The author began his paper by saying that he felt it had become a primary necessity to introduce the world of shipping to the lighting engineer. Hitherto, marine experts have been mainly pre-occupied with other matters such as navigational hazards, construction problems, safety at sea, etc., to the consequent neglect of marine lighting and the present-day result that much of current ship-lighting practice is completely out-of-date.

After explaining the broad classifications of shipping both as regards the Royal Navy and the Mercantile Marine he then examined the current rules and regulations for the electrical equipment of ships and stressed that nearly all these regulations dealt with electrical, mechanical and safe construction as distinct from illuminating engineering.

Superstructure lighting was next considered and it was pointed out that navigational lighting equipment has not kept pace with modern practice in other fields such as railway signalling. However, figures were quoted to show that even with the outmoded equipment still in use there are more collisions by day than by night. Attention was then directed to command bridge lighting and the author suggested that the problems here are similar to those encountered in the lighting of aircraft control panels. A particular comment was that from the lighting engineer's viewpoint it is a bad thing to look at a radar screen with eyes night-adapted.

Deck and emergency lighting were

then discussed with particular reference to the use of gangways and deck passages at night and the possible interference with navigational lighting.

The author then went on to deal with the interior lighting of ships pointing out the different requirements for vessels of the Royal Navy and those of the Merchant Navy. In the latter case the requirements ranged from the lighting of cargo spaces to the lighting of accommodation for crew and for passengers. In many of these applications colour rendering and the avoidance of glare were most important. The lighting requirements in tankers were also discussed and the author drew attention to the need for flameproof fittings and other special lamps and above all for efficient maintenance in this type of vessel.

Forthcoming Events

LONDON

March 8

Current Applications of Electroluminescence, by P. W. Ranby and P. J. Clewer. Federation of British Industries, 21, Tothill Street, S.W.1. 6 p.m.

April 12

Office Lighting, by L. H. Hubble (Joint meeting with ASEE). Federation of British Industries, 21, Tothill Street, S.W.1. 6.15 p.m.

CENTRES AND GROUPS

March 2

EDINBURGH Design and Aiming of Area Floodlighting Installations, by G. K. Lambert. YMCA Social Room, 14, South St. Andrew Street. 6.15 p.m.

NEWCASTLE UPON TYNE Designed Appearance Lighting of Gloucester Cathedral, by J. M. Waldram, Room B7, Percy Buildings, Kings College, Queen Victoria Road. 6.15 p.m.

March 3

GLASGOW Design and Aiming of Area Floodlighting Installations, by G. K. Lambert. Followed by AGM. British Lighting Council, 29, St. Vincent Place. 6.30 p.m.

NOTTINGHAM Large Area Floodlighting, by G. K. Lambert. Electricity Centre, Carrington Street. 6 p.m.

March 10

MANCHESTER Characteristics and Applications of Photo-Cells, by F. A. Benson. Demonstration Theatre, Town Hall Extension. 6 p.m.

March 11

BATH AND BRISTOL Annual Dinner and Dance. Hawthorns Hotel.

March 14

SHEFFIELD Television Studio Lighting, by R. W. Koplick. Grand Hotel. 6.30 p.m.

March 15

LIVERPOOL An Architect's Impression of the Brussels Exhibition, by J. G. R. Sheridan. Merseyside and N. Wales Electricity Board Industrial Development Centre. 6 p.m.

NORTH LANCASHIRE Annual General Meeting. Demonstration Theatre, North Western Electricity Board, 19, Friargate, Preston. 7 p.m.

March 21

BATH AND BRISTOL The Integration of Light with Sound, by H. Hewitt. Gardiner, Sons & Co. Ltd., Broad Plain, Bristol.

LEEDS Lighting in Corrosive, Flammable and Explosive Situations. A survey of the IES Technical Report No. 1 to be introduced by J. G. Holmes. British Lighting Council, 24, Aire Street. 6.15 p.m.

March 28

BIRMINGHAM Recent Developments in Exterior Lighting on the Continent, by A. G. Penny. Regent House, St. Phillips' Place, Colmore Row. 6 p.m.

LIGHTING INSTALLATIONS

MISCELLANEOUS

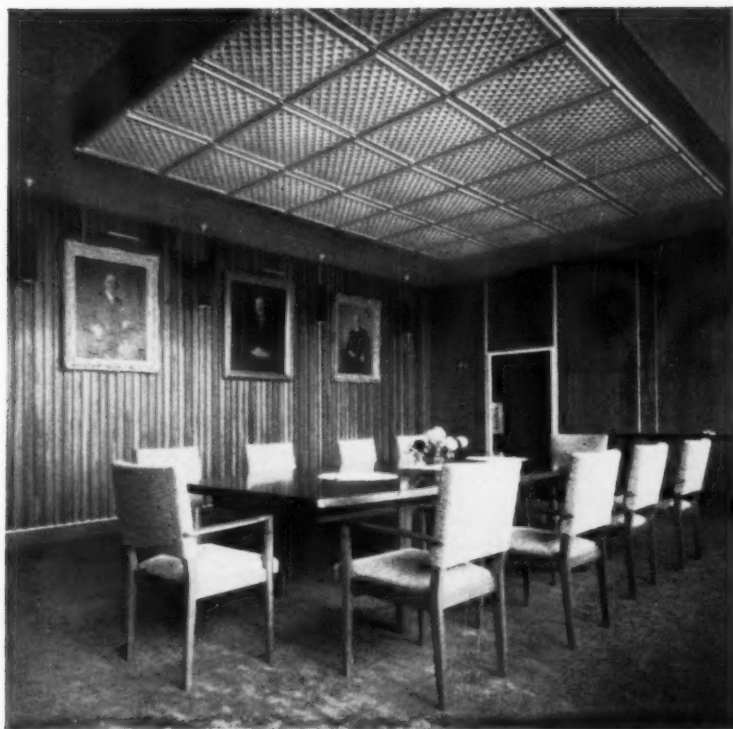
For Advertising Conferences

Conference room at Foote, Cone & Belding's new premises in Baker Street. Lighting is from a purpose-made fitting of steel conduit and sheet steel cylinders, finished matt black. Each cylinder houses two 100-watt tungsten lamps. Architects, Russell Orme & Partners; interior design, 'Colourpoint'; lighting fittings, T. Clarke & Co. Ltd.



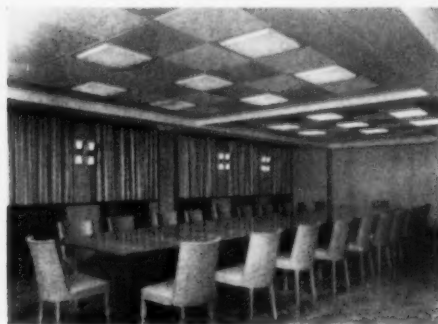
For Directors' Dining

Below, new directors' dining room of the Standard Motor Co., Fletchamstead, Coventry. A rectangular section of the Burgess acoustic ceiling is lowered 12in. and acoustic tiles are replaced by plastic eggcrate louvers. Above are rows of 5ft. fluorescent lamps. Along the left-hand wall is a row of fittings comprising matt-black cylinders of aluminium suspended from the ceiling with white flex. Design, Architects Department, Standard-Triumph Group Service Ltd.



For the Egg Marketing Board

Below, this board room is in Wingate House, in the basement of which is the Columbia Theatre illustrated in Light and Lighting for June, 1959. The room is lit mainly by 14 modular fittings, arranged in a chequerboard pattern—each fitting replacing one of the moulded acoustic ceiling tiles. Housing four 2ft. 20-watt lamps, they are fitted with dished 'Perspex' diffusers. Supplementary lighting is from twin diabolo-shaped wall brackets. Architect, Eric H. Davie, FRIBA, AMTPI, of the architects' department, Hillier, Parker, May & Rowden; lighting fittings, Troughton & Young (Lighting) Ltd.



LIGHTING INSTALLATIONS



Carpet Showroom, Cardiff

'Sylvalume' luminous ceiling panels provide localised lighting over each of the carpet stocks in this showroom designed by Clive Hunt, MSIA, for BMK. The panels are suspended from the ceiling in a 'floating' frame; the light source is 'Northlight' fluorescent lamps (for good colour rendering) in 5ft. 'Atlantic' fittings. The average illumination level is about 25 lm/ft². General lighting is from 'wafer' fittings suspended below the false ceiling; entrance lighting is from a group of 14 'Domino' fittings; while wall displays are lit by more 'Northlight' lamps with remote-control gear. Interior decor and lighting installation, Heal & Sons Ltd.; lighting fittings, Atlas Lighting Ltd.

Library, Sheffield University

The first of the new buildings under construction for Sheffield University to be completed, this library is one of the largest of its type in the country. It houses a million books, about 130,000 of them available to readers on open access. Illustrated is the vast first-floor catalogue hall, giving access to reading rooms and other public rooms and accommodating card index cabinets, bookshelves for works of reference, and the combined issue desk and voucher counter. Lighting is from a luminous ceiling of corrugated vinyl 3,900 sq. ft. in area, serving also as to diffuse daylight from roof glazing above. The artificial lighting source comprises 150 5ft. 80-watt warm-white fluorescent lamps located high above the ceiling in the deep plenum space. Architects, Gollins, Melvin, Ward & Partners; electrical contractor, Yorkshire Electricity Board; luminous ceiling, Lumenated Ceilings Ltd.



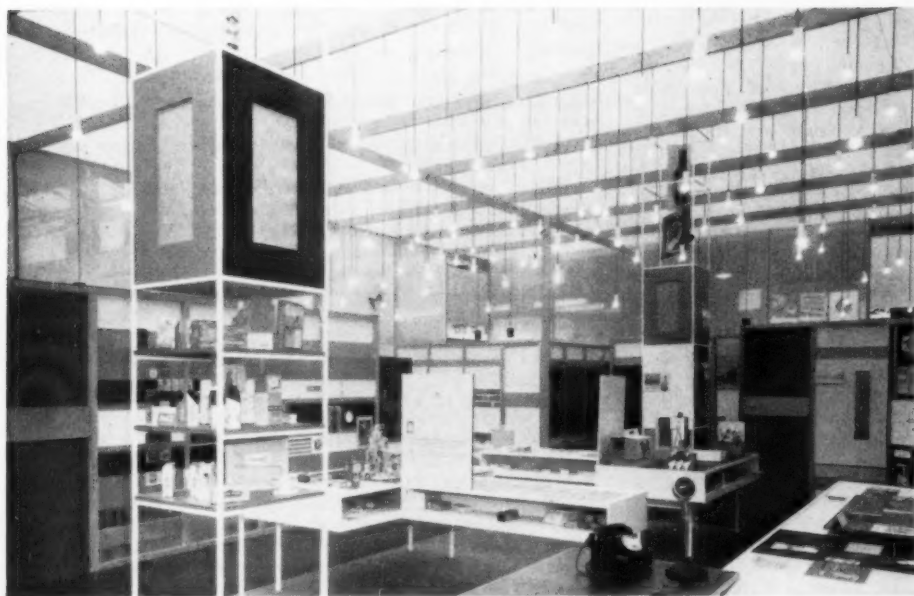
MISCELLANEOUS



Co-operative Store

Oxford St., London, W.1

Premises for the London Co-operative Society's first central London store were, before the war, occupied by Peter Robinsons. During the war the building was taken over by the BBC, who relinquished it in 1957. Extensive alterations were required and most of the interior had to be demolished before shopfitting could commence. There are six sales floors (total area, 32,000 sq. ft.), with general lighting, as above, from fluorescent fittings recessed into the ceiling of moulded plaster panels. The fittings have opal 'Perspex' diffusers projecting about 2in. below the ceiling. In the jewellery and cosmetics departments and the record department illustrated on the right there are pendant tungsten fittings with opal glass shades. Architects, Duke & Simpson; lighting fittings, Courtney, Pope (Electrical) Ltd.



Exhibition Stand

At the 1959 Packaging Exhibition this stand for John Waddington Ltd. was based on the design of the Charles Eames 'House of Cards' game, which John Waddington make in the UK, together with other toys designed by this controversial American. The stand was designed mainly as an enclosed structure, with display tables for the principal groups of products. Ancillary products were shown on panels and on two display towers. Lighting was provided by nearly 150 naked 60-watt lamps, random suspended at heights from 7ft. 6in. to 11ft. above floor level from the white valarium. Lampholders were covered by stove-enamelled sleeves. Stand designed by Conran Design Group; made by Conran Contracts.

LIGHTING ABSTRACTS

OPTICS AND PHOTOMETRY 535.24

778. IES guide for photometric measurements of mercury lamps.

Illum. Engng, **54**, 655-657 (Oct., 1959).

Prepared by the Sub-Committee on the Photometric Measurement of Mercury Vapour Lamps of the American IES, this report gives guidance on the measurement of the luminous flux and intensity of mercury vapour lamps. Precautions in the use of the two photometers, an integrating sphere and a candlepower distribution photometer, are outlined. Lamp stabilisation and control of ambient temperature are important. Colour correction of the light receptors is essential when the test and comparison lamps have dissimilar spectral distributions. The electrical parameters of the lamps under test should be determined in accordance with the recommendations of the appropriate American IES Guide. P. P.

628.971.6

779. Factors in visual perception in public lighting.

A. CHAUCHEREAU, *Bull. Soc. Franç. Elect.*, 7th Series, **9**, 610-620 (Oct., 1959). In French.

The author reviews the many factors which enter into vision in streets at night, collecting findings by various experimenters on the Continent, and gives photographs of the appearance of a small icosahedron in various positions in different installations as a contribution to the study of the appearance of solid objects. J. M. W.

780. Tests on retroreflectors at great distances. 535.87

D. A. FLEURY, *Bull. Soc. Franç. Elect.*, 7th Series, **9**, 597-609 (Oct., 1959). In French.

The paper describes photometric tests carried out very carefully on a series of catadioptric rear reflectors of various types (tetrahedral reflectors, lenses and "Scotchlite") using visual photometry and comparisons of point sources. The effects of size of source and of receptor are explored. The article is concerned mainly with the method of measurement and its consistency. J. M. W.

612.843.367

781. A simple objective method of determining the effect of glare on the ability of the eye to see.

L. H. BLONBERG, *Ljuskultur*, **31**, 87-88 (No. 2, 1959). In Swedish.

The eye movements which can be detected by means of the potential difference between the front and back of the eyeball can be used to detect the presence of glare due to direct or scattered light. The pattern of eye movements changes, in the presence of glare, and this change can be measured objectively. A special visual field consisting of alternating vertical bands of light and dark, is used to generate an "optokinetic nystagmus" the changes in which are correlated to the glare effect. R. G. H.

LAMPS AND FITTINGS

782. New designations for mercury lamps. 621.327.4

W. S. TILL and M. PISCIOTTA, *Illum. Engng*, **54**, 594-596 (Sept., 1959).

The American Standards Association has prepared a new code, American Standard Method for the Designation of Mercury Lamps, in order that mercury discharge lamps which are completely interchangeable both electrically and physically can be similarly identified, rather than have as many as four or five distinctly different designations, as was formerly the case. The new coding consists of four basic parts, the letter M to identify that it is a mercury lamp, a number or numbers to identify the electrical characteristics of the lamp, two letters to identify the essential physical characteristics of the lamp and a colour symbol. P. P.

621.326:628.97

783. Present day questions in automobile lighting.

P. DEVAUX, *Bull. Soc. Franç. Elect.*, 7th Series, **9**, 575-596 (Oct., 1959). In French.

The paper reviews the evidence in favour of selective yellow filters for automobile lamps; automobile signals, giving the intensities at present specified in France and in USA and the angular limits required; the development of the present European passing beam, and consideration of twin headlight systems, and finally, in the principal section of the paper, an analysis of the conditions of electrical supply on vehicles and their effects upon the light output and luminance of lamps, and on their life. It is found to be impossible to design a lamp which will satisfy properly the conditions on older and on new vehicles, in which the mean voltages differ; in any event, the variations of voltage which occur are such as to produce unacceptable variations of life and light output. Details of the statistical calculations appear in two appendices. J. M. W.

612.843.31

784. Assessment of color rendition under an illuminant using color tolerances for natural objects.

C. L. SANDERS, *Illum. Engng*, **54**, 640-646 (Oct., 1959).

An earlier paper (Abs. 775) described how colour tolerance ellipses for natural objects had been recently determined. The results of this study have now been used to assess the colour rendering characteristics of a number of different illuminants when used to view the same series of natural objects. The effect of chromatic adaptation has been allowed for by using an "adaptation chart" to correct for the illuminant chromaticity, while an arbitrary numerical rating scale has been attached to the earlier colour rendition judgments in order to make the data more readily applicable to the present study. The resultant ratings for the illuminants accord well with every-day experience of their colour rendering characteristics. P. P.

621.327.43

785. Application possibilities of wide range dimming of fluorescent lamps.

P. E. MASSIE and A. B. ROSENSTEIN, *Illum. Engng*, **54**, 636-639 (Oct., 1959).

Modern aircraft with 115/200 volt, 400 c/s power supplies offer wide possibilities for the use of fluorescent cabin and cockpit lighting. Requirements of boarding and disembarking, serving of meals, reading, sleeping and circulation demand different lighting levels, which can be readily met with present-day dimming circuits using lamp current control by means of series saturable reactors. Other applications of fluorescent dimming circuits are in cinemas, theatres, restaurants and for television viewing in the home. P. P.

621.329

786. Designing low brightness luminaires for higher lighting levels.

Q. D. DOBRAS and D. R. PHILLIPS, *Illum. Engng*, **54**, 627-633 (Oct., 1959).

Higher lighting levels increase the need to control luminaire luminances and thus avoid discomfort glare. A way which has recently been developed to minimise glare without effecting any great loss of emitted light is to use a system comprising louvers which are wedge-shaped, with parabolic curved sides having a specular finish. Numerous graphs illustrate the effectiveness of this technique in relation to other materials and surface treatments in reducing luminances at angles below about 45° from the horizontal, while design data (coefficients of utilisation, etc.) for industrial-type and large-area luminaires are given in tabular form. P. P.

621.329

787. How to improve ballast testing.

W. W. BROOKS, *Illum. Engng*, **54**, 647-650 (Oct., 1959).

When testing a fluorescent lamp ballast, draughts and changes in ambient temperature affect the light output of the lamp in the testing circuit and result in inconsistencies in the ballast measurements. A technique known as "External Temperature Control" has now been devised which maintains a short length of the lamp wall at a constant temperature by

means of water cooling. This stabilises the mercury vapour pressure and reduces the light output variations from 6.8 to 0.23 per cent, with consequent improvement in the consistency of the ballast measurements.

P. P.

LIGHTING

- 788. Recommended levels for selling the goods.** 628.972
Illum. Engng., **54**, 507-511 (Aug., 1959).

Continuing a series of articles [Abs. 751 and 753] illustrating, by means of photographs and brief technical descriptions, ways in which the new American IES recommended levels of illumination have already been adopted in the USA, shop windows and shop interiors are now dealt with.

P. P.

628.971.6

- 789. Instrument for demonstrating the glare from street lighting installations.**

F. W. MULLER, *Lichttechnik*, **11**, 538-540 (Oct., 1959). In German.

A photograph of a street is mounted on a board and is illuminated partly from the front and partly from behind. In this way it is possible for an observer to make a number of independent changes in the appearance of the street. He can alter the street surface brightness, the brightness of the fittings and the area of fitting visible. He can also change the brightness of lighted shop windows on either side of the street and can switch on or off the headlights of a car facing him from a short distance away. The instrument was used at the 1959 Industries Fair in Hanover to show how the glare experienced in a street at night is affected by the various contributing factors.

J. W. T. W.

- 790. Integrated lighting—air conditioning systems.** 628.972
W. S. FISHER and J. E. FLYNN, *Illum. Engng.*, **54**, 615-624 (Oct., 1959).

The present trend towards extremely high levels of illumination in the USA has introduced problems of dissipating the accompanying heat. For example, at 400 lm/ft² the lighting can account for more than 70 per cent of the air conditioning load. If the generated heat can be extracted through the luminaires in an integrated lighting—air conditioning system, then significant economies in the cooling load can be effected. This is demonstrated by numerous diagrams illustrating the heat dissipation from fluorescent and incandescent lamps and the various possible modes of "integrated" cooling, and by graphs and tables illustrating the economies which can be achieved.

P. P.

- 791. Lighting for low-ceiling classrooms.** 628.92
Illum. Engng., **54**, 651-654 (Oct., 1959).

Prepared by the Sub-Committee on Lower Ceiling Classrooms of the American IES, this report deals with the daylighting of classrooms defined as being 10½ ft. or less in height or having a depth exceeding 2½ times the ceiling height. Supplementary daylighting will usually be required and can be provided by windows or clerestories in opposite walls or by skylights of plastic, glass or glass block. Fenestration in two adjacent walls is not advocated. Particular attention should be given to the avoidance of window heads which are significantly lower than the ceiling, to the provision of properly designed luminance control devices (blinds, louvres, glass blocks, etc.) and to the reduction in size, or entire elimination, of mullions, glazing bars, etc., obstructing the window opening.

P. P.

- 792. Recommended practice for marine lighting.** 628.97
Illum. Engng., **54**, 597-607 (Sept., 1959).

Prepared by a Sub-Committee on Marine Transportation of the American IES, this new recommended practice deals with the lighting of the principal living, dining and working areas found in merchant ships, including those tasks and areas, both interior and exterior, concerned with the navigational and operating functions of these ships. The document includes a table of recommended illumination levels applicable to shipboard activities, and deals with the particular choice of light sources and distribution systems appropriate to shipboard lighting.

P. P.

- 793. A well-lit office in Gothenburg.**

Ljuskultur, **31**, 139-140 (No. 3, July-Sept., 1959). In Swedish. Fluorescent fittings are mounted in the cornice above the windows. Elliptical mirror reflectors project the light across the room and give correct directional effects. The installation is simple and levels above 45 lm/ft² are obtained depending on the arrangement of fittings.

R. G. H.

- 794. Luminescent tubes and art.**

G. GUNTHER, *Ljuskultur*, **31**, 71-75 (No. 2, 1959). In Swedish. Combinations of different types of fluorescent lamps are very suitable for the illumination of pictures, most of which are painted in daylight. A proportion of 3:2:1 of the three types of "Daylight," "Sunlight-white" and "Soft-white" respectively gives an excellent result.

R. G. H.

- 795. Thoughts on street and traffic route lighting.**

P. SANDGREN, *Ljuskultur*, **57**, 93-97 (No. 2, 1959). In Swedish. The relation between lighting and accident frequency is discussed and the various modern methods of lighting described. It is estimated that traffic accidents cost 500m. Sw. Kr. (approx. £35,000,000) per annum, of which one-third occur at night, and of which one quarter can be eliminated by better street lighting. On this basis good lighting would save 40m. Sw. Kr. per annum. (£3,000,000).

R. G. H.

628.972

- 796. The permanent supplementary artificial lighting of interiors.**

R. G. HOPKINSON and J. LONGMOORE, *Trans. Illum. Eng. Soc. (London)*, **24**, 121-142 (No. 3, 1959).

Rising costs demand that more efficient use should be made of available building space. A way of achieving this is to construct deeper rooms with lower ceilings, the daylighting at the backs of such rooms being permanently supplemented with artificial lighting. The economic balance depends to a large extent on the level of the supplementary lighting. Experimental studies in model rooms have been carried out to determine this level, the design criterion being a satisfactory integration between the daylighting at the front of the room and the artificial lighting at the back of the room over a wide range of outdoor conditions.

P. P.

628.93

- 797. A simplified procedure for the routine calculation of coefficients of utilisation based on the Jones-Neidhart data.**

R. H. SIMONS, *Trans. Illum. Eng. Soc. (London)*, **24**, 153-167 (No. 4, 1959).

A disadvantage of the Jones-Neidhart method over the Harrison-Anderson method for preparing tables of coefficients of utilisation is the much greater amount of labour involved. A simplified procedure is now proposed in which the light distribution of a luminaire is broken down into three components, a uniform radial component (as from a point source), and lower and upper residual components, the former of which is identified by a cosine function. The calculation procedure is demonstrated by a step-by-step worked example, and an indication is given of the way in which wall and ceiling luminances can be determined. The simplified procedure involves a loss in accuracy, but even so the agreement with the Jones-Neidhart method is good, coefficients of utilisation determined by the two methods never differing by more than 0.02.

P. P.

- 798. Street lighting quality.** 628.971.6
J. B. DE BOER, *Lichttechnik*, **11**, 596-604 (Nov., 1959). In German.

The factors which influence the performance of a street lighting installation are (a) the general luminance level, (b) the degree of glare, (c) the luminance distribution in the field of view, (d) the layout of the light sources in relation to the lines of the street and (e) the colour of the light. Each of these factors is discussed in some detail and photographs illustrating the different points made, especially under (c) and (d), are reproduced. The use of sodium to guide traffic through or around a built-up area otherwise lighted by corrected mercury or by fluorescent is described.

J. W. T. W.

Lighting in a Shopping Centre

SHOPPING centres which are barred to traffic and where people can do their shopping or window gazing without fear of being run over are one of the features of the new towns which have been incorporated in plans for other areas where rebuilding is in progress. The lighting of these shopping areas has made new demands on the lighting engineer for lanterns and columns which must not only be functional but have greater aesthetic merits than those normally used for street lighting.

A feature of the Winston Square shop-

ping centre at Barry in Glamorganshire is the attractive double row of coloured post-top lanterns on timber columns which fit in very well with the surrounding buildings by day and which by night give cheerful glare-free lighting.

Though no doubt chosen mainly for their appearance both lanterns and columns are designed to give long service. The lanterns (Siemens 'Cathay') are made of an aluminium alloy which is resistant to the corrosion of the salt-laden atmosphere of coastal towns. The columns are made of Malayan Kapur which is a very tough timber.



Above, a daylight view of Winston Square, Barry, showing the timber columns and post-top lanterns. Left, a night view.



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At the Physical Society's Exhibition

A report on some exhibits at the 44th Exhibition of Scientific Instruments and Apparatus, held at the Horticultural Halls, Westminster, January 18-22.

FOR anyone whose primary interest is in lighting, the emphasis this year at the Physical Society's Exhibition was undoubtedly on colour. Pride of place should be given to a very well-conceived and admirably arranged series of exhibits, staged by the Society's Colour Group to demonstrate the phenomena associated with colour adaptation. The first exhibit, a strip of grey material laid on two adjacent backgrounds of contrasting colours, showed how the strip tended to take on the hue complementary to that of its background. Then a series of tins, all painted yellow but decorated with designs in different colours, showed the so-called "spreading effect" which caused the body colour to shift its tone towards the colour of the design. The fact that colours change appearance from, say, orange to brown or yellow to olive-green, according to the brightness of the background, was the theme of an experiment which the visitor was invited to perform. The demonstration of Maxwell's spot, due to non-uniformity of colour response over the surface of the retina, showed clearly the difficulties of colorimetry with a large field of view. An old friend, Bidwell's white sector disc rotating in front of a red lamp which appeared a pronounced blue, was the next exhibit and then came an array of samples showing the familiar effect of staring at a strongly coloured surface and subsequently transferring the gaze to a neutral or unsaturated coloured surface.

Colour reproduction using only two colours: Perhaps the high-light of the whole exhibit was the group of viewing booths leading up to a demonstration of the recently publicised scheme proposed by Dr. Land in America for reproducing a whole range of colours by the use of only two coloured stimuli. Two photographs of an object or group of objects are taken, one through a red filter and the other through a green. The first photograph is projected in red light and the other in white. The eye becomes adapted to a colour somewhere between the red and the white so that the red parts still remain red, while the whites appear in the complementary blue-green. The colours are, of course, very unsaturated but the possibilities are interesting.

Next came a series of exhibits showing effects in colour photography which arise from the fact that, while the eye adapts to the colour of the surroundings, the film cannot do so. A demonstration of the fact that a colour match is not affected by adaptation was followed by exhibits showing how changes in the subjective appearance of objects due to adaptation had been studied; it was not difficult to link this with Winch's experimental work at Wembley.

Although it was no part of the Colour Group exhibit, or even a demonstration of adaptation effects, an interesting comparison of the colour rendering by De Luxe Natural fluorescent lamps with that given by the ordinary Natural lamps may be mentioned here. Staged by Atlas Lighting it showed two demonstration booths, each with an array of foodstuffs generally recognised as suffering in appearance under fluorescent lighting. The difference was so marked that a visitor of a sceptical turn of mind asked the demonstrator to interchange the raw steak that looked so really "natural" under the de luxe lamp with its comparatively "dead" counterpart. The interchange was effected with triumphant success.

Electroluminescence and fluorescence: On the same stand as the demonstration just described there were a number of devices depending on electroluminescence, most of them for the display of information in one form or another. An interesting development was the incorporation of electroluminescent phosphors in ceramic layers applied to metal surfaces by special enamelling techniques, giving durable plates suitable for self-illuminated instrument dials and the like. With certain special phosphors a plate could be made to exhibit yellow light when excited by a direct potential, but blue or green light with an alternating excitation.

Instruments for measuring fluorescence were shown by Mr. W. Harrison of Preston and by PATRA (the Printing, Packaging and Allied Trades Research Association). In the PATRA "Sheen" abridged spectrophotometer the sample was illuminated by a xenon arc lamp with a glass filter giving light of a spectral distribution similar to that of daylight, so that the colour of a fluores-

cent material as it appeared by daylight could be measured. Mr. Harrison, well known to members of the Illuminating Engineering Society, showed his fluorescence measuring unit, specially designed for the examination of textiles and paper containing so-called "optical bleach." In this instrument the equivalent of an illuminant with as much uv as daylight can be obtained by using the projector lamp with a daylight filter and then adding readings obtained through an ultraviolet filter.

Colorimeters: As usual there were a number of colorimeters, some of them designed for special applications, such as the "Colormat" shown by Baldwin Instrument Controls, or the Megatron colour temperature meter. A self-contained absorptiometer was exhibited by A. Gallenkamp and Co. Ltd. In this the light source was a 6-watt lamp supplied from a constant voltage transformer and readings of the light transmitted by a sample in different regions of the spectrum could be made with a photovoltaic cell.

A very ambitious instrument, the "Colourmeter" has just been put into production by Hilger and Watts Ltd., and this was shown for the first time. Direct readings of the tristimulus values of the light reflected from a sample are obtained on separate scales, shown one at a time as three filters in turn are placed over the light source. The chromaticity co-ordinates on the CIE system can then be found quite simply and it is claimed that the absolute accuracy is ± 0.005 over a wide area of the colour chart, while differences can be determined to about 0.0005.

Photometers and photocells: Little photometric apparatus, in the strict sense of that term, was to be seen. The cosine-corrected illumination photometer of Megatron Ltd. was again on view, while on the stand of Evans Electro Selenium Ltd. there was the "Eel" microphotometer and a recording flame photometer, as well as a nephelometer for determining turbidity by measuring the light scattered in passing through a test tube containing the sample. Of special interest was the reflector photometer developed by the Road Research Laboratory of the DSIR and shown by W. Ottway and Co. Ltd. With this instrument the performance of a reflector, or sample of reflectorised material, can be measured at observation angles of between 0° and 30° and at entrance angles

from 0° to 20°. The illumination is provided by a 6-volt 108-watt ribbon filament lamp, operating at a colour temperature of 2854°K, which evenly illuminates a small aperture. This light is "chopped" at a frequency of 400 cycles per second and projected to the reflector through a collimating lens. Thus the incident light is sensibly parallel and the reflected light passes back through the collimating lens and is focused on to the cathode of a corrected photomultiplier which feeds a selective amplifier.

A large range of photomultiplier cells was shown by 20th Century Electronics Ltd. and Rank Cintel Ltd. showed two types of cadmium sulphide photoconductive cells. Cells of this type are very suitable wherever a change of light intensity is employed to carry out a switching operation and a miniature switch acting on this principle was shown by Fleming Radio (Developments) Ltd. It was stated that this switch would operate with an illumination as low as 20 millilumens per square foot and make or break a current of up to 10 amps. The use of photoconductive cells to control

street lighting automatically was shown, still in the development stage, by Ericsson Telephones Ltd.

Before leaving the subject of photocells, it is worth noting that Mullard's Education Service provide a number of well-produced booklets explaining how certain demonstration units can be home-constructed from readily obtainable components. One of those shown at the exhibition dealt with photocells and should be of considerable value to anyone teaching the principles and practical applications of photoelectricity. It is understood that the booklets can be obtained quite freely from Mullard House.

Light sources: There were a number of interesting exhibits of lamps on the AEI stand. In particular, the movement of ions in a sodium-vapour with rare-gas discharge was shown by stroboscopic projection. Then there were the large compact HPMV lamps with forced air cooling, rated at 1750-watts and 1000-watts, with an initial efficiency of 45 lm/W, a life of 500 hours and an initial maximum luminance of 35,000 and

25,000 cd/cm² respectively. By contrast, the latest types of filament lamps for projection purposes were also shown. These included lamps with fused silica bulbs for infra-red and ultra-violet radiation and projector lamps incorporating internal mirrors.

Finally mention may be made of an instrument shown by Claude Lyons Ltd. and designed for studying eye movements. There is a steady difference of potential of some tens of millivolts between the cornea and the retina and much reduced voltages appear at the skin surrounding the eye. Movements of the eye relative to the head cause differences in the distribution of these potentials and so records of such movements, during reading for example, can be obtained.

The attendances at the exhibition seemed to be as large as usual and so was the pressure on exhibition space. In fact the exhibition committee acknowledged the courtesy of certain regular exhibitors (among them The Tintometer Ltd.) who voluntarily stood down on this occasion to allow others to exhibit.

MISCELLANY

Correspondence

Luminous ceilings

Dear Sir,—Our attention has been drawn to an article in your December issue, entitled "Luminous Ceilings Reviewed" and written by a Mr. R. L. C. Tate. In this article Mr. Tate refers to the 'Isora' Illuminating Ceiling, for which we are the sole concessionaires in the United Kingdom.

Unfortunately, so many errors and false impressions occur both in the text and in the illustrations purporting to describe the 'Isora' system that we feel we must ask you to allow us to correct these through the medium of your correspondence columns.

In the first place, the photograph on page 360 is incorrectly described as illustrating an 'Isora' ceiling in a restaurant. In fact, it shows a ceiling recently installed at the Haymarket premises of the American Express Co. Inc. This was a most successful high-quality installation and has directly resulted in us receiving a further order for a ceiling at this company's Mount Street, W.1, offices. We make this point particularly in view of Mr. Tate's astonishing and quite unwarranted remark that the 'Isora' system is "not suitable for high-quality installations". We feel certain

that the many clients for whom we have installed ceilings in banking halls, conference rooms, showrooms, hotels, art galleries and shops during the last twelve months would resent this remark much more than we do! Mr. Tate also states that the diffusing properties of the pvc film are poor. Diffusion is of course relative, but bearing in mind the exceptionally high light transmission of the material, we consider that, for the majority of installations, we have achieved an equitable balance between transmission and diffusion. Mr. Tate omits to mention that, where a higher degree of diffusion is necessary, more opaque films are available to meet this requirement. Indeed, one of the features of the 'Isora' system is that virtually any translucent, opaque or printed pvc film can be used on the panels, thus giving architects and designers great scope for creating infinitely variable ceiling effects.

A further comment by Mr. Tate is that the ceiling is less effective in wholly artificial lighting conditions. We can only say that this is completely untrue, as any visitor to our stand at the recent Building Exhibition at Olympia will certainly testify.

Finally, we must refer to the sketch on page 365 (figure 7). This contains the following errors: spot-welding has been discontinued for well over six months and we now use a patented clip-fixing. Similarly, the 39 in. grid has been altered to 40 in. The suspension

hangers are of $\frac{1}{4}$ in. steel rod, not $\frac{1}{2}$ in. and the depth of the main section is $3\frac{1}{4}$ in. and not $\frac{1}{2}$ in. as shown.

Considering all the above, and the numerous other omissions in Mr. Tate's description of the 'Isora' system (e.g., pressurised rooms, A.E.I. Lamp and Lighting Co. Ltd.'s new lighting assembly for the ceiling, etc.) we cannot help feeling that the author would have been well advised to check his facts with us before allowing this otherwise interesting article to be published.

P. B. BLOOD.

SFIM (Great Britain) Ltd.

Dear Sir,—I should like to comment on Mr. Blood's letter as follows:—The diffusing properties of the 'Isora' ceilings I have seen myself are poor. One of these is in the Building Centre where one would expect the Company concerned to display the best example possible of their product. All the drawings except that dealing with the Trott System were developed from published leaflets of the companies concerned. It is unfortunate that the 'Isora' leaflet was out of date, but it was sent to me within the last three months. In any case, my sketches were not intended to be taken as working drawings, but merely to indicate the basic principles of the ceilings concerned. The really unique quality of the 'Isora' Ceiling, that it is made of flexible pvc was, I think, made abundantly clear.

R. L. C. TATE.

Book Review

"Factory Building Studies No. 2: The Lighting of Factories," by M. J. Keyte, A.R.I.B.A., and H. L. Gloag, A.A.Dip., A.R.I.B.A. Published by HM Stationery Office for the DSIR Building Research Station. 28 pp. with 30 illustrations. Price 3s. 6d.

This publication, with well selected illustrations and useful drawings, has achieved most admirably the intention referred to in the Preface by Dr. Lea of helping factory managements to assess their particular lighting requirements, so that they may brief their architect and lighting engineer.

The first few pages, devoted to the principles of good lighting, are generally adequate although the section describing the effects of certain types of artificial lighting suffer somewhat for being so brief, especially if acceptability is included as a factor in visual efficiency. Two examples of the importance of colour rendering are given but the fact that suitable colour judgment can be completely consistent in any part of the country when carried out independently of daylight is not mentioned.

In the daylight section the Figs. 4 to 19 which show Daylight Factors from a minimum of 5 to a maximum of 21 per cent are most valuable but one would have liked the "advisability" of a 5 per cent minimum DF to have been a firm recommendation. The warning regarding additions which might be installed overhead, to the detriment of the lighting, to say nothing of the appearance of the interior, should have been in heavy type underlined.

The relationship between illumination and wattage is included as a guide, but it should be read in conjunction with the summary at the end of the section "Lighting Principles" which says: "On no account should lighting be considered to be merely a matter of windows and fittings . . . good lighting is therefore concerned with the whole environment within a factory."

The section on maintenance and cleaning in no way underestimates this problem which tends to become more acute, both with the high cost of labour and the need to avoid any interference with production. Table 2 provides a ready means of assessing the merits of some typical light sources used in factories, but it should be borne in mind that the figures for the loss of watts in the gear will only be achieved with the best equipment.

The publication concludes with a section dealing with factories where there is partial or total reliance on artificial lighting, and there is a warning

that artificially lit areas may appear excessively gloomy or under-illuminated on days where there is sunshine or bright clouds, unless the installation will provide 50 to 100 lm/ft². Such values of illumination may surprise some executives but, so long as the caution contained in this study that extra care to ensure a high standard of design for the whole working environment is followed, work will be carried out well and without strain.

E. B. S.

Situations

Vacant

Joseph Lucas (Electrical) Limited have a vacancy for a RESEARCH OFFICER to work on problems associated with the advanced research and development of lighting equipment for road vehicles. The work is interesting and varied, involving many problems in improving driving lights and signalling lamps to meet conditions in this country and overseas markets. Applicants should have a degree in Physics or Engineering or be Graduates or Associates of the Institute of Physics and some experience in illuminating engineering would be an advantage. The post is permanent and pensionable and a good starting salary will be paid. Apply in writing, stating age, qualifications and experience to the Personnel Manager, Joseph Lucas (Electrical) Ltd., Great King Street, Birmingham, 19, quoting reference PM/D/363.

The Illuminating Engineering Department of Atlas Lighting Limited has a vacancy in the London Office at Thorn House for an experienced LIGHTING ENGINEER, age group 23-28. The position offers wide scope in a progressive office, with exceptionally good working conditions and environment. Applications in writing to: Personnel Officer, Thorn Electrical Industries Ltd., Thorn House, Upper St. Martin's Lane, W.C.2.

DESIGNER DRAUGHTSMAN for Electric Lighting Fittings. London area. Good prospects. 5-day week. Apply stating age, experience and salary required to Box 702.

TECHNICAL WRITER required by Philips Electrical Limited for their Lamp and Lighting Group. The work will include the preparation and editing of material for journals and trade papers, and relevant experience in a similar field will be considered an asset. Technical background preferably but minimum requirements include a lively interest in sales promotion and the ability to assess news value in this specialised field. Please write fully to the Assistant Employment Officer, Century House, Shaftesbury Avenue, W.C.2, quoting ref. 312.

REPRESENTATIVE required by lighting fitting manufacturers to cover contractors and wholesalers in London area. Generous car allowance and expenses, etc. Salary according to experience. Apply Box 703.

Lumenated Ceilings Ltd. have a vacancy for an experienced LIGHTING ENGINEER, able to discuss lighting problems with architects, consultants, etc. The position is permanent, pensionable and carries a good salary and bonus. Applications giving full details should be sent in confidence to Chief Lighting Engineer, Alliance House, 12, Caxton Street, London, S.W.1.

DESIGNER required for work on lighting fittings; some knowledge of the preparation of production drawings. Age 19-22. Full details of experience and salary required to Troughton & Young (Lighting) Ltd., 143, Knightsbridge, London, S.W.1.

Atlas Lighting Limited require TECHNICIANS for interesting work in Lamp Development Laboratory situated in North London. Previous experience in lamp - making, glass - working, high vacuum or lighting techniques desirable. Applicants aged 18-35 years should write giving full details to Dev./Lab., Atlas Lighting Ltd., Angel Factory Colony, Angel Road, Edmonton, N.18.

SALES PROMOTION MANAGER wanted by Harris & Sheldon (Electrical) Ltd. to take charge of sales in the London Area. A technical qualification and high level contacts with architects, consulting engineers and other specifying authorities are essential. Age 35-40 with several years' selling experience in lighting equipment. High salary will be paid to the person exactly meeting the requirements for this important appointment. This post is subject to non-contributory superannuation. Apply in writing to Harris & Sheldon (Electrical) Ltd., Ryder Street, Birmingham, 4.

SALES ENGINEER required in the Birmingham area to promote the sale of commercial and industrial electric light fittings for expanding company. Should have a good connection and considerable experience in selling lighting equipment to all levels, in addition to technical ability. Competence to design lighting installations an advantage. Age about 30. Attractive remuneration, superannuation and suitable car are offered. Apply to Harris & Sheldon (Electrical) Ltd., Ryder Street, Birmingham, 4.

Personal

DR. GEORGE MACFARLANE, a Deputy Chief Scientific Officer at the Royal Radar Establishment, Malvern, has been

appointed Deputy Director of the National Physical Laboratory. He succeeds DR. EDWARD LEE, who becomes Director of Stations and Industry Divisions at the Department's Headquarters.

DR. R. C. G. WILLIAMS, Chief Engineer of Philips Electrical Ltd., is among the distinguished scientists and engineers of the Board of the newly-created College of Technologists, set up under the auspices of the National Council for Technological Awards, which will administer and confer a new award, MCT (Member of the College of Technologists) the technological equivalent of a University PhD and a development of the DipTech (Diploma in Technology).

MR. J. E. A. HEALE, formerly works manager of the Motherwell works of Metropolitan-Vickers (now AEI (Manchester) Ltd.), has joined Associated Electrical Industries (Woolwich) Ltd., as general manager of works. His successor is MR. E. CAMPBELL, who has been with the instrument and meter division at Manchester.

Obituary

Charles Johnston Chisholm

It is with deep regret that we report the death on December 22, of Mr. C. J. Chisholm, who collapsed and died on his way home from Sheffield Town Hall. Mr. Chisholm had been Public Lighting Engineer of Sheffield since 1950, having previously held similar posts in Stockport and Greenock. He also served with the Glasgow Lighting Department for several years. In Sheffield he had been responsible for a large scale change-over from filament lamp to sodium lamp lighting work on which is still being carried out. He was a Fellow of the IES and a past-chairman of the IES Sheffield Centre and a member of the council of the APLE. He was one of the leading street lighting engineers of this country and had made many contributions to safety on the roads.

Trade Literature

'ISORA' ILLUMINATING CEILINGS, Bedford Avenue, Slough, Bucks. An illustrated brochure describing the construction, installation, maintenance and cost of the 'Isora' translucent suspended ceiling.

LINOLITE LTD., 118, Baker Street, London, W.1. Catalogue No. 39 together with the current Price List giving full details of striplighting in modern lighting installations.

GENERAL ELECTRIC CO. LTD., Magnet House, Kingsway, London, W.C.2. Fully illustrated brochure giving information on the new 'Variform' range of lighting

fittings. This range includes pendant fittings, ceiling units, single and double wall brackets.

ATLAS LIGHTING LTD., Thorn House, Upper St. Martin's Lane, London, W.C.2. Brochure giving details and prices of the new range of Chelsea Hand-wrought Glass lighting fittings.

AEI LAMP AND LIGHTING CO. LTD., Melton Road, Leicester. Illustrated booklet showing some of the ways 'Mazda Neta-bulb' can be used to improve lighting in the home.

TROUGHTON & YOUNG (LIGHTING) LTD., 143, Knightsbridge, London, S.W.1. New comprehensive catalogue, TYL.23, covering all fittings currently available including ceiling fittings, wall brackets, recessed fittings, table and standard lamps.

H. W. FIELD & SON LTD., Harold Wood, Essex. Leaflet giving prices and circuit diagrams of control gear for the operation of fluorescent lamps.

Industrial Notes

ATLAS LIGHTING LTD. announce the re-organisation of their Research and Development facilities, involving the formation of a Lighting Development Group under the control of Mr. H. Hewitt. The Group is based on the Atlas Lighting Laboratories at Enfield, under Dr. J. W. Strange, and is concerned with the application of light sources and the development of lighting techniques. Atlas have also retained Mr. H. C. Weston, OBE, FIES, as consultant on light and vision. Mr. Weston, whose name is always associated with the IES Code, recently retired from the staff of the Medical Research Council. He is a past-president of the IES and has made a special study of lighting requirements for workers and is a world authority on lighting and visual performance.

THE GENERAL ELECTRIC CO. LTD. has reorganised its General Products Group. Five new Groups have been formed and each will be under the control of a Group Managing Director, who will be responsible for the overall planning, direction and control of the activities of each Group, including design, development, production, sales and distribution. The Groups and their Managing Directors, whose appointments took effect on January 1, are: Domestic Equipment Group (Mr. E. A. Fowler) incorporating the present Domestic Equipment Division; Installation Equipment Group (Mr. R. H. Phillips) incorporating the present Installation Equipment Division and Pirelli-General Cable Division; Lighting and Heating Group (Mr. D. L. Tabraham) incorporating the present Lighting Division and Industrial

Heating Department; Osram Group (Mr. A. E. Page) incorporating the present Osram Lamp Division and all glass and lamp component units; Radio Group (Mr. M. M. Macqueen) incorporating the present Radio Division.

S.L.R. ELECTRIC LTD. announce that the 1960 price sheet for their existing catalogue No. 35 is now available and may be obtained from their head office at 2, Peterborough Road, Harrow, Middlesex.

THE BRITISH LIGHTING COUNCIL has issued a new edition of its brochure entitled 'Lighting for Printing.' It covers every aspect of lighting in the printing industry from general requirements to the specific needs of each process, the advantages to be gained from the colour properties of certain lamps and the productive value of good lighting which is properly maintained. The glossary of technical terms used in the printing industry will be useful to lighting engineers. The brochure consists of 16 pages plus cover and is well illustrated. The price is 1s. 6d. per single copy, £5 10s. per hundred copies.

THE SOCIETY OF GLASS TECHNOLOGY has replaced its former bi-monthly journal with two new publications (also bi-monthly). They are *Glass Technology* which contains reports of applied science in the glass industry, and *Physics and Chemistry of Glasses* in which will be published reports of original studies of the physics and chemistry of glasses both experimental and theoretical. Further details can be obtained from the Society at Thornton, Hallam Gate Road, Sheffield, 10.

THIS SPRING, for the first time in its 45-year history, ships will sail through the Panama Canal by night as well as by day. The darkness that previously prevented the operation of its three locks after nightfall will be swept away by 750 fluorescent luminaires made by the General Electric Company of the USA. These 6ft. two-lamp units, normally used for street lighting, are being mounted on the walls of the locks on 20ft. aluminium poles. The poles are hinged at their bases to enable them to be swung outwards for the passage of especially wide vessels. The new lighting will end costly delays. At present, a ship arriving at the canal in the late afternoon has to lay over until next day before proceeding through the locks.

AS FROM January 1 the name of Claude-General Neon Lights Ltd. has been changed to Claudgen Ltd. This alteration has been made mainly for brevity but has the advantage of bringing the company's name into line with its trademark.

Postscript

ON January 19th a new regulation came into force regarding the lighting of Zebra crossings. This requires local authorities to attach an additional light source to crossing poles just beneath the illuminated yellow globes—wherever the visibility of pedestrians about to use the crossing at night needs to be improved. The effect of the additional light sources will only be to illuminate the extremities of crossings and the adjacent areas of pavement. This supplementary lighting is not intended as a permanent substitute for better street lighting, but the cost of installing and maintaining it will rank for Government grant. Various methods of improving the lighting at Zebra crossings have been suggested and considered before the method now authorised was selected. Vehicle drivers and pedestrians alike will no doubt welcome the new practice.

I HAVE the greatest admiration for nurses as a body although all this body is not uniformly "bright". Hence it is with no thought of disparagement that I quote a few student nurses' howlers in a recent examination which may afford readers a little "innocent merriment". The most pertinent of these is "The best room for eye trouble is one which is well alight". Of course this is not a howler at all if taken literally, but its author certainly never intended this. Other amusing verbal slips occur in the following:—"The eye is the organ of site, the sight of which is in a holler in the temple". "At the back of the eye one may see a retinue". "The severity of an attack of coronary thrombosis depends on the sight of the clot". But the most irrelevant to our subject yet the most chastening to us all is surely "Food should be kept covered in shops because of the diseased types who buy it"!

A FRIEND has shown me a copy of the BLBS (better light better sight) News of November, 1959, which contains a laudatory article on the Blackwell Report. By now readers of *Light and Lighting* will probably know that this report to the American IES has provided that Society with material which is thought to justify a general and substantial increase in their recommended values of illumination. Probably, however, only a handful of people in this country know very much about this report and I doubt if any of these share the view expressed in the BLBS News that Blackwell's findings amount to "one of the most dramatic and significant developments that has occurred in the lighting industry since Edison's invention of the electric lamp". The BLBS News quotes a statement that "Quite possibly in number of observations, research staff, and investment, the Blackwell studies over the past 12 years equal or approach the total of all former studies relating lighting and seeing". The number of observations is said to be some ten million, the research staff involved exceeds 40 and the investment has been more than \$1,500,000! Commenting on these statements in the light of the results achieved, one of my acquaintances who is knowledgeable on this subject ventured to paraphrase a really great man's words: "Never", he said, "never in the field of

vision research has so much been paid to so many for so little". So, opinions evidently differ in this as in so many matters.

UNLIKE the villagers, to whom I referred last month, who do not want street lighting, the inhabitants of two Nottingham suburbs who live in unlit, unadopted roads, want street lighting so badly that they have erected their own lamps. It appears that the road conditions are so founderous and the womenfolk so frightened to traverse the roads at night that householders have combined to light the roads themselves, the cost of operating the system being met by the local ratepayers' association. There are, of course, numerous private roads up and down the country which have to be maintained and lighted—if they are lighted—at the expense of the residents, apart from the rates they pay. It seems, however, that if the particular residents in Nottingham who want their private roads lighted are prepared to defray the equipment and installation costs the local council will cover the operating charges. If more householders were to equip their premises with good porch-lights these would be very helpful in poorly lighted residential streets even if they contributed very little light to the carriageway.

THE effects of what is called technically "sensory deprivation" have been under study for some time both here and in the USA for reasons that have nothing to do directly with lighting practice. Nevertheless, it is obvious that sensory deprivation can be brought about by deprivation of light and, to a lesser degree, by poor lighting or by a comparatively featureless field of view. Acute mental and emotional disturbances can be produced by extensive sensory deprivation, but partial deprivation or sensory monotony can also have undesirable effects and this is, in fact, contributed to by some modern lightings. It is thought that sensory deprivation is at least partly responsible for the tendency of aged persons to become mentally confused at night, and it has been suggested that they should sleep in lighted bedrooms. Children's fear of the dark, especially in the silent hours of the night, is an effect of sensory deprivation. Not that the trouble is due solely to the scantiness of the visual and auditory sensory input; but that, in the absence of the normal flood of various impressions, the mind has difficulty in interpreting and co-ordinating the restricted sensory messages it receives. Hence the horrid imaginings and illusions that may be conjured up by a seemingly formless dimness seen in the otherwise total darkness of a room. Sensory restriction at night is one of the factors militating against safety in night driving. When only vehicle lights are available much of the peripheral field of vision is virtually blank and information that is of more value to us than some people think is denied us. Moreover, because what is visible in the beam of the lights is partly out of context and partly revealed in unfamiliar ways misinterpretation is sometimes disastrously easy.

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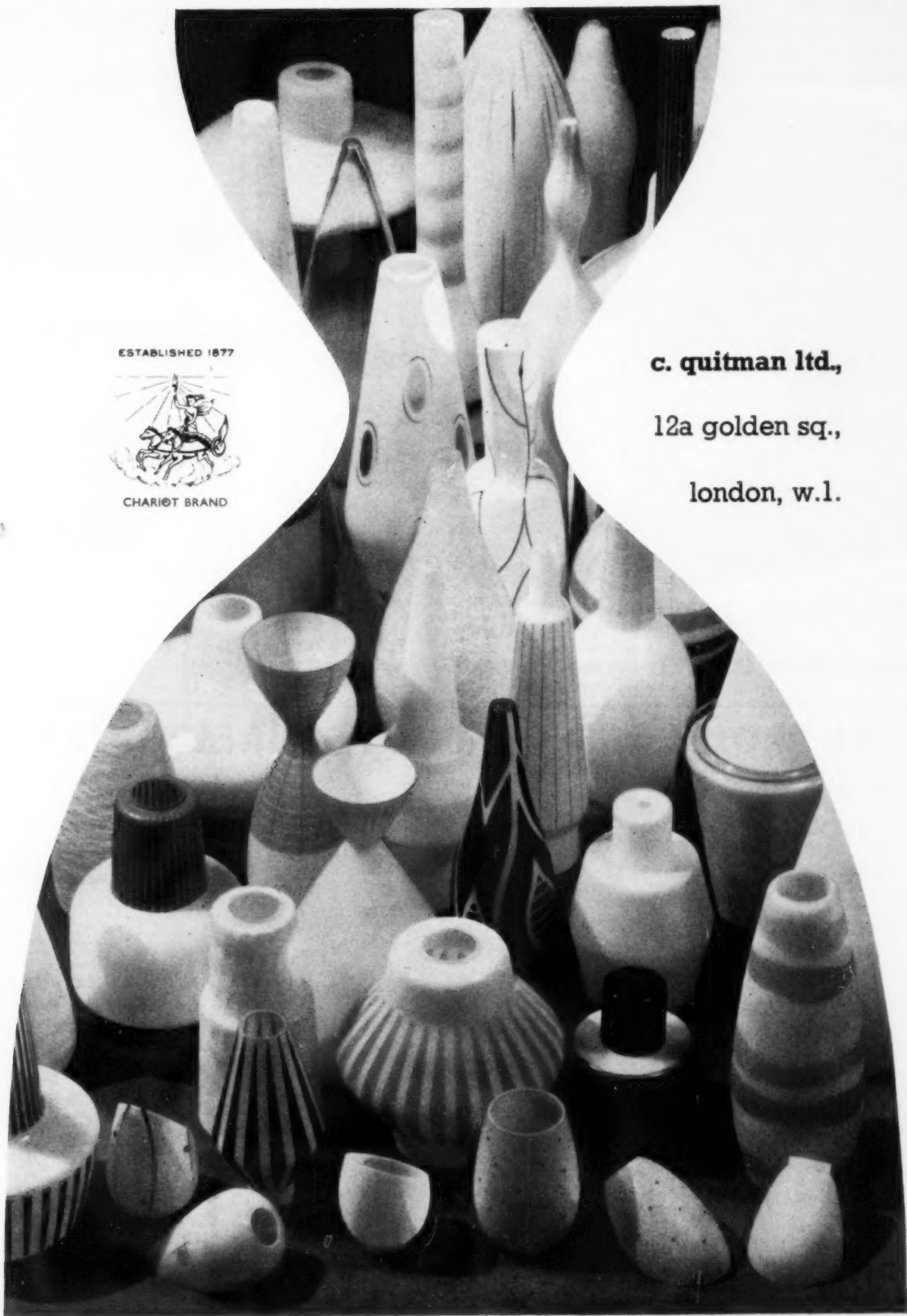


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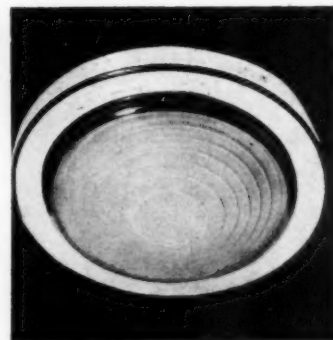


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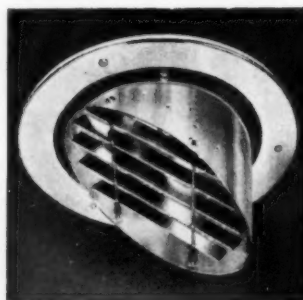
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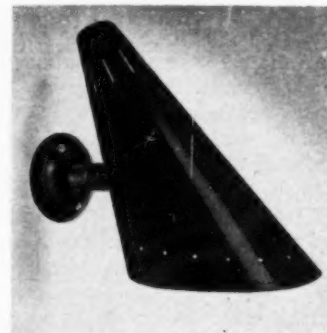
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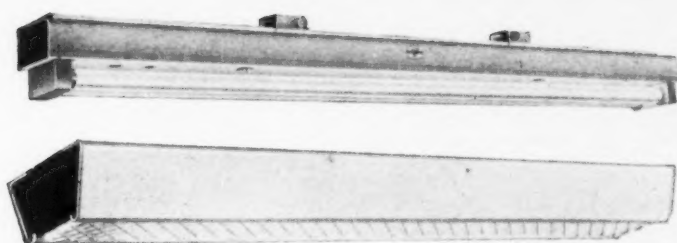


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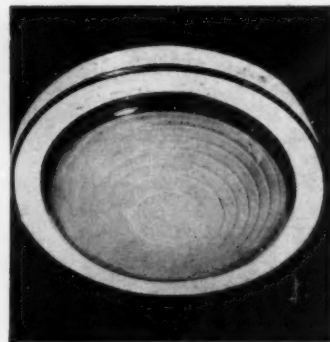
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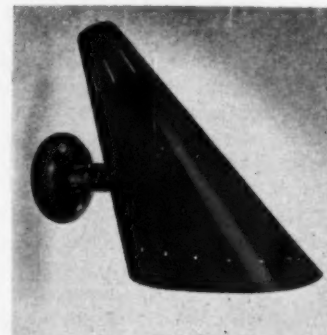
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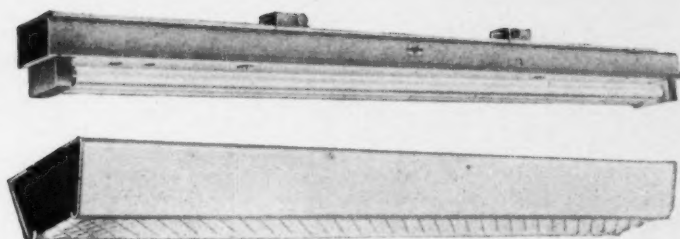


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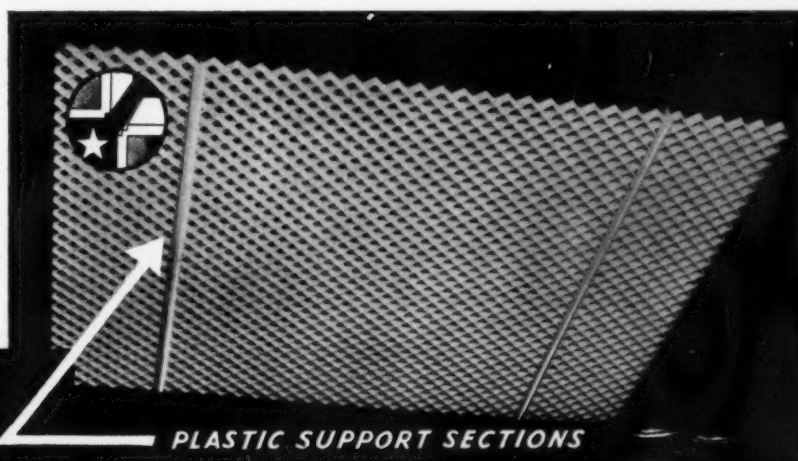
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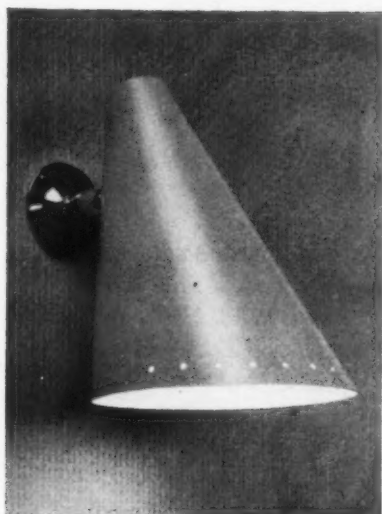
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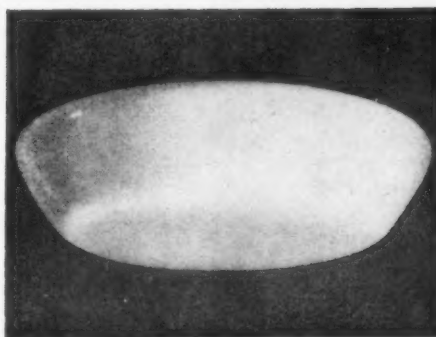
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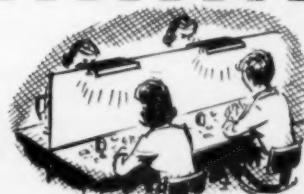
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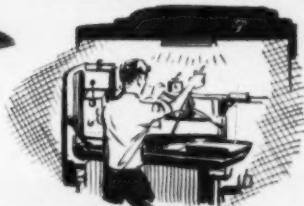
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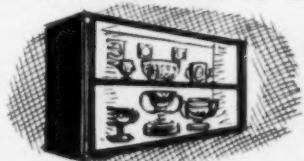
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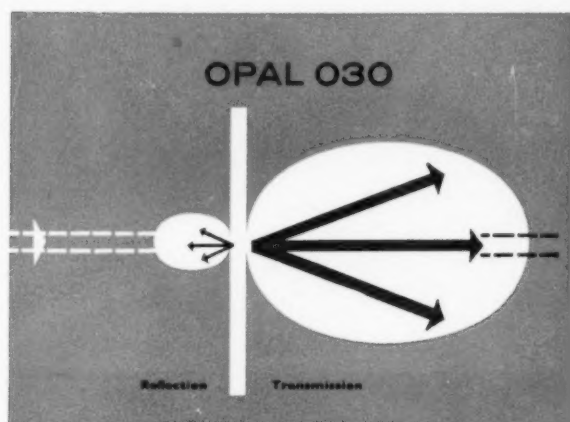
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HERE ARE the optical properties of the I.C.I. range of opal grades of 'Perspex' acrylic sheet in convenient reference form. The diagrams show at a glance (for $\frac{1}{8}$ " thick sheet) the transmission, reflection and diffusion characteristics of the materials enabling you to select the correct grade for your particular applications.

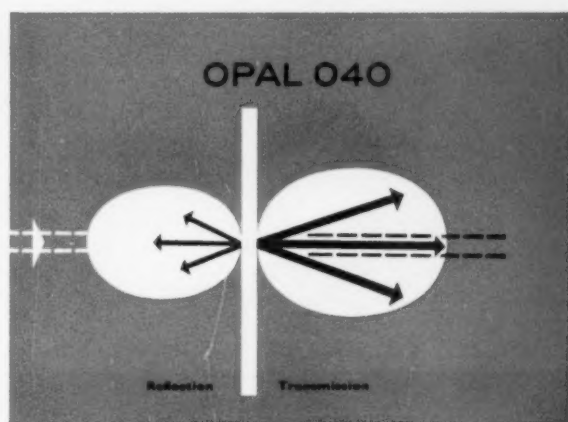
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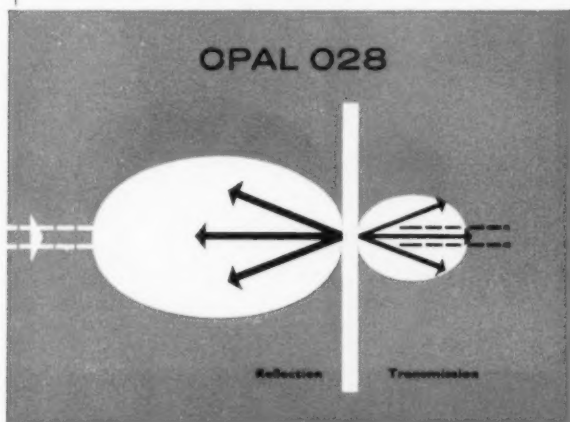
In addition to the four opal grades illustrated, many other grades of tinted opal and patterned 'Perspex' are available.



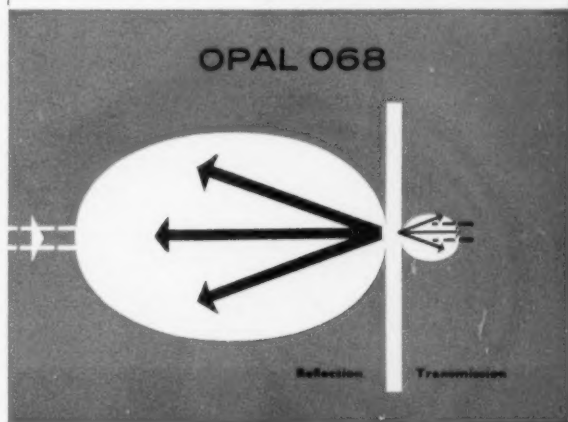
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Diffusion factor 0.41



040 Transmission factor 0.55 Reflection factor 0.41
Diffusion factor 0.87



028 Transmission factor 0.28 Reflection factor 0.67
Diffusion factor 0.89



068 Transmission factor 0.08 Reflection factor 0.83
Diffusion factor 0.89

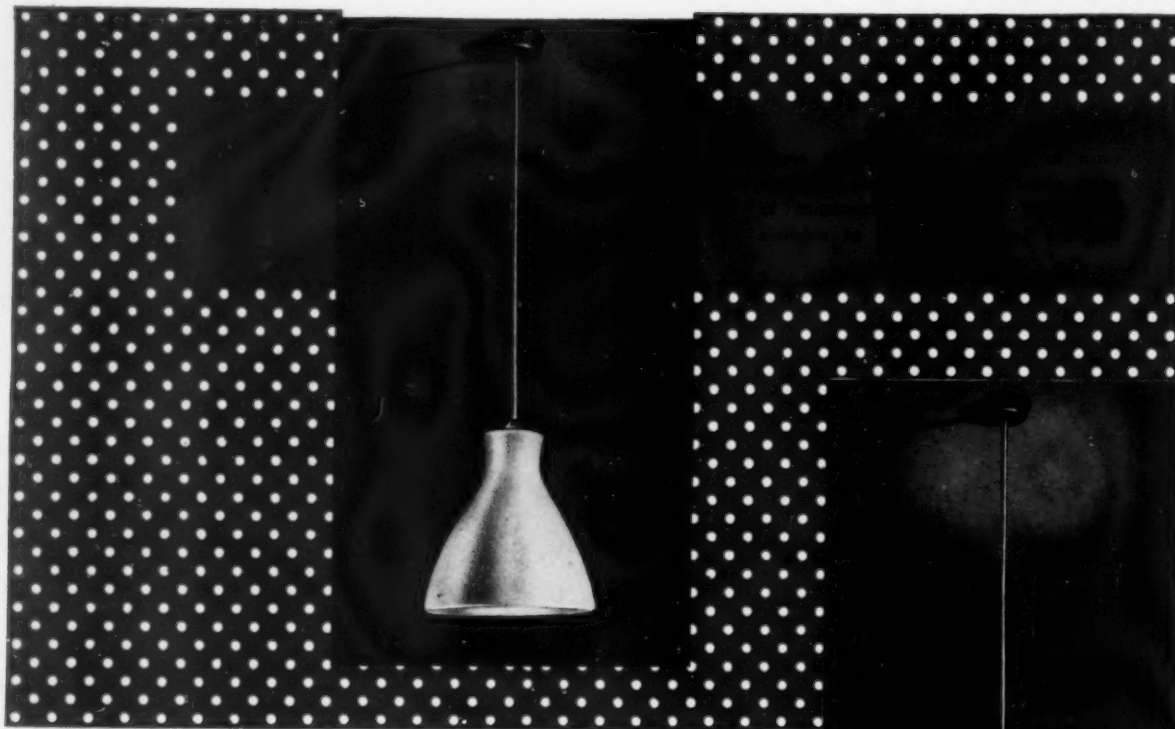
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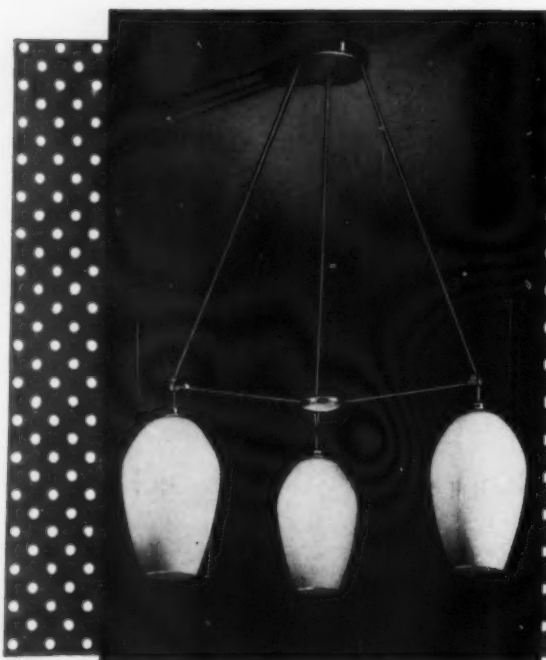
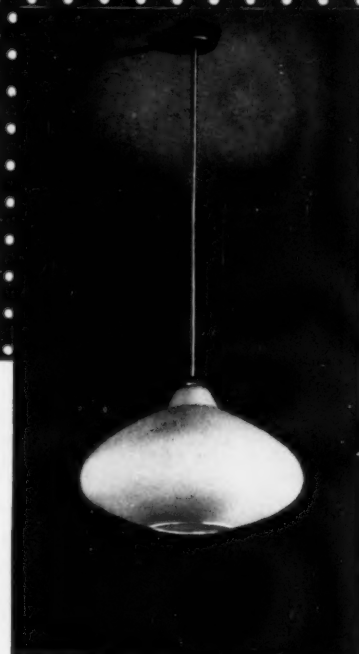
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